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CENTRAL INTELLIGENCE AGENCY

REPORT

**INFORMATION REPORT**

CD NO.

COUNTRY Czechoslovakia

DATE DISTR. 6 Jun. 1949

SUBJECT Czechoslovak Mines

NO. OF PAGES 1

PLACE  
ACQUIREDNO. OF ENCLS.  
(LISTED BELOW)DATE  
ACQUIREDSUPPLEMENT TO  
REPORT NO.

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booklet entitled, "Czechoslovak Mines",

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# CZECHOSLOVAK MINES, NATIONAL CORPORATION



# Czechoslovak Mines

ORGANIZATION, PROBLEMS, AND TASKS OF THE NATIONALIZED CZECHOSLOVAK MINES



*Title: Czechoslovak Mines • Publisher: Czechoslovak Mines, National Corporation,  
Propagation Department • Compiled & Edited by arch. Vladimír Hipman • Maps:  
arch. Jiří Cafourek • Photos: arch. Vladimír Hipman • Translation: I. B. Wood •  
English Edition: 3000 copies • The 1st Volume of the Czechoslovak Mines Library •  
Published in June, 1948 • Printed by Česká grafická Unie a. s., Prague.*

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*The great interest of foreign countries in our nationalized industry has given us cause to issue this informative publication. The mining section of nationalized industry answers here numerous questions from abroad.*

*Into a frame of a concise description of the development of our mining and of the deposits of minerals, there is set a condensed, but truthful, picture of the nationalized mines, mainly as their organization, problems and future are concerned.*

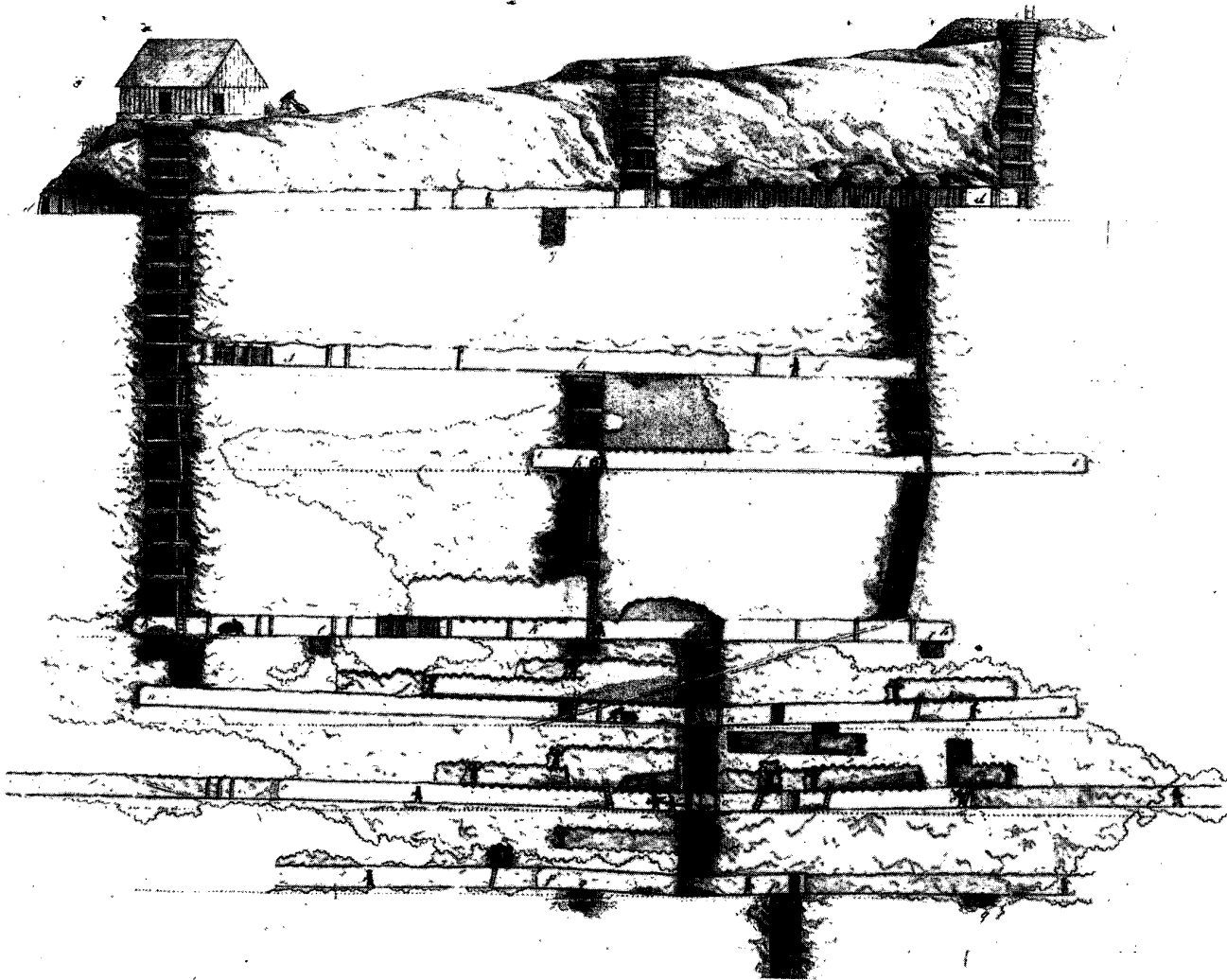
*I hope that this publication will contribute to the mutual recognition of the countries where the mines have been nationalized.*

A handwritten signature in dark ink, appearing to read "J. Ryšavý". The signature is fluid and cursive, with the first letter of the last name being a large, stylized 'R'.

GENERAL MANAGER OF THE CZECHOSLOVAK MINES.



*Work of miners and mode of life at Kutná Hora at the end of the 15th century.*



*Silver-mining at Vožice in 1826.*

## **The Development of Czechoslovak Mining.**

**1.**

*Since ancient times mining, in the countries of present Czechoslovakia, has been an important part of man's activity. Rich occurrences of useful minerals gave rise to outstanding mining, well developed according to the typical stages of civilization. Several preserved archaeological documents enable us to trace the development of mining as early as the age when man first replaced his stone arms and tools by metal ones.*

*Many legends and stories relating to mining, which were handed down to succeeding generations or found in old chronicles, have often been proved to be true by new discoveries of characteristic features of former mining works.*

The most primitive mining of copper-ore, which to start with was naturally carried out only where the ore was deposited very near the surface, was probably the very first beginning of a systematic mining work at all. Copper was used for the manufacture of bronze commodities as well as for decorative purposes. The exploitation of iron-ore deposits in the eastern part of the territory of our present state was developed later. The origin of a primitive iron production is to be dated back to this time.

In our mining history the chapter on gold and silver mining is of great fame. To begin with these two rare metals were recovered by washing them out from their placer-deposits and not for some time were the gold and silver bearing ore-veins exploited.

The placer-deposits, rich in gold, extended in long stripes along the banks of the rivers Otava, Blánice, Sázava, Vltava, Opavice and their tributaries. Though we have not enough written or reliable reports preserved from which we could accurately find out the extent of former gold production, we are still able to make approximate conclusion from the residuents of this ancient activity in so far as they have not been removed by natural and or human actions.

The mines of Kašperské Hory, Sedlčany, Nový Knín and of the Příbram district are to be mentioned from amongst the numerous old gold-mines as ones of some importance. The almost fabulous fame of the gold mines of Jílové, which - according to tradition - were supposed to be the richest gold mines known in the 14th century, is still a matter of scientific disputes and investigations. The only one of the old gold mines, the one at Roudný, was in operation until recently. According to authentic historical sources silver had been systematically extracted from the beginning of this millenary in the mines of Jihlava, Německý Brod, Kutná Hora, Jáchymov and Příbram. Of all these only the silver mines of Příbram are still in operation. There are no detailed documents preserved about the activity of the old mines of Jihlava; we only know that during the 14th century silver coins were struck at Jihlava. There is no doubt that numerous wars, riots and fires destroyed most of the valuable written sources from which we could conclude the extent of the Jihlava mining. But even so there remains enough evidence of the outstanding position of mining in the Jihlava district.

More information is available about the silver mines at Kutná Hora, Jáchymov and most of all about the mines at Příbram. It is quoted, that the silver mines at Kutná Hora delivered to the royal treasury of King John of Luxemburg five to six hundred talents of silver weekly. During the reign of King Charles IV and his son Wenceslas IV the development of the silver mines at Kutná Hora still continued.

During this period of prosperous gold and silver mining, many magnificent churches and palaces were built in this country, the city of Prague greatly enlarged and the famous University of Prague was founded. Some idea of the productivity of the silver mines of Kutná Hora can be made from the historical statements collected and published by the Count Jasper of Sternberg. According to his calculations, the silver mines of Kutná Hora produced about eight and a half million talents of silver during 380 years (1240—1620). The prosperity of these mines continued till the outbreak of the Husite Wars during which the mines sustained damages to such an extent that they never regained their former high level of productivity. Nevertheless, mining work was maintained henceforth, even during the Thirty Years' War. But at the beginning of the 19th century the operation of the mines at Kutná Hora was limited to a rather occasional and divided work of merely a research character. In addition to these silver mines the gold and/or silver mines of Jílové, Příbram and Jáchymov developed to the end of the 15th century. At the beginning of the 16th Century the development of the silver mines of Jáchymov reached its height under the



*The Příbram ore-mine "Anna" in 1850*

ownership of the Counts Šlik who - according to some statements - won from these mines not less than 60,000 florins yearly. It was at Jáchymov that the famous silver coin "thaler" had been struck in the year 1519 for the first time. The Thirty Years' War, nearly put an end to the silver mines of Jáchymov, as most mines were flooded and mining operations restricted to a very few places. The mining of silver at Jáchymov continued, even if in a very small extent, and not without many interruptions, till the middle of the last century, when attention was drawn from silver to uranium-ore.

On the grounds of authentic historical sources, the 14th century can be taken for the beginning of a systematic mining of silver and lead ores at the Příbram district. But it seems to be probable that even before that time numerous mines had been in permanent operation there. So, Příbram can be considered as the only mining district where mining - with the exception of some intervals - has been carried on continuously from the 14th century up to the present. The opening of the new Vojtěch mine at Březové Hory near Příbram in the year 1779 started the period of more than centenary development and prosperity of the silver and lead mining at the Příbram district. Since 1779 the yearly production of silver rapidly rose from 200 kg to 36,000 kg achieved at the end of the 19th century. In 1875 the shaft of the named Vojtěch mine became famous throughout the whole mining world for reaching the depth of 1,000 metres as the very first shaft.

Besides succeeding on the technical and economical field of mining activity, the Czech mining experts laid the foundations of the Mining Law, and by their literary and technical works founded a tradition which, at the beginning of this millenary, acquired fame and a leading position among the other countries of Europe.

In addition to the notes in chronicles there is to be mentioned the old document on mining issued by the Czech prince Břetislav in the year 1045 and handed down to succeeding generations.



Coal-mine "Gabriela" at Karvinná in 1864 (now called "UNRRA").

It was in the countries of the Czech Crown, in the town of Jihlava, that the Mining Law was codified in the year 1249. This Mining Law of Jihlava, written in Latin, was later accepted as a precedent for the mining codes in other countries. About the end of the 13th and the beginning of the 14th centuries, the natural richness of the ore deposits of Jihlava diminished, and as a result of these circumstances the centre of mining activity passed from Jihlava district to the silver mines of Kutná Hora. At the beginning of the 14th century, King Wenceslas II issued a new Mining Law for the mines of Kutná Hora and other mining districts. The fact that this Mining Law was translated into Spanish as late as in the 16th century proves the greatness of this code. This Spanish translation, of the Mining Law mentioned, served then as a basis of mining regulations used in the mining of Spanish colonies in South America.

In the 15th century the mining district of Jáchymov was of no less importance and fame than those of Jihlava and Kutná Hora once used to be. A special mining regulation had also been issued for the mines at Jáchymov; this regulation was in force for other mines too, and, after several adaptations for altering conditions, became a basis of the Mining Law valid up to the present.

In the first half of the 16th century George Agricola, the physician of the town of Jáchymov, and a prominent scientist, and mining specialist, wrote his immortal works on mining and metallurgy which gave birth to the later technical literature. It was at Jáchymov, in the year 1716, that the mining school was founded as the first educational and training institution of this kind in the world.

The development of mining as regards technical equipment and working methods went on in our country, on the whole, as much as it did in other countries in Europe, and later in the overseas countries. We sometimes, under the influence of local occurrences and conditions, stayed behind the continental average, but there also were other periods, when our mining was one of the most developed.

Since a long time ago the primitive tools of miners – the crossed hammer and chisel – have been the insignia of mining. These tools were used long before blasting work was known. The miners of olden days made their arduous work easier by means of fire and water making the rock softer and more breakable. Further, the miners used as their tools picks, wedges, crowbars, levers, hammers, shovels, scrapers and baskets. All the work had to be done by hand on ly; the conveying and hauling of material had also to be carried on by manpower, or as at some of the bigger mines, by animal-power. For shaft-winding of material and pumping water, different types of windlasses, treadle-wheels, capstans and horse-gins were used. However, utilization of waterpower in mining never reached such a high grade as in iron- and metal-works, which were possible to found close to water streams.

It was not until the steam-engine was invented that mining was developed to such a degree enabling other branches of industry to grow to the extent known to us to-day. And it was the mining industry – that often and unjustly used to be blamed for excessive conservatism – which first introduced the use of the steam-engine. In the early days, not only the winding- and pumping-machines, but also the fans and haulage-machines were driven by steam. By steam-engine were driven the compressors producing the compressed-air, which later, replaced the steam underground. But now this kind of driving-power is giving way to electricity, the efficiency of which, in comparison with that of compressed-air, is manifold. Till now, only the local, natural conditions, from a safety point of view, hinder a still more extensive use of electricity underground. With regard to technical equipment, working methods and safety, our mines, above all our coal-mines, have achieved a very high level during the last twenty years.

Though, so far we have talked only about the mining of copper, iron, gold, silver, and lead, there is no doubt that our mining, on becoming acquainted with new metals and minerals, extended its activity also in new directions.

In our country there occur and are obtained many ores, such as iron, manganese, antimony, tin, and tungsten ores; also the ores containing more or less gold, silver, zinc, copper, cobalt, nickel, bismuth, molybdenum, mercury, sulphur, etc.

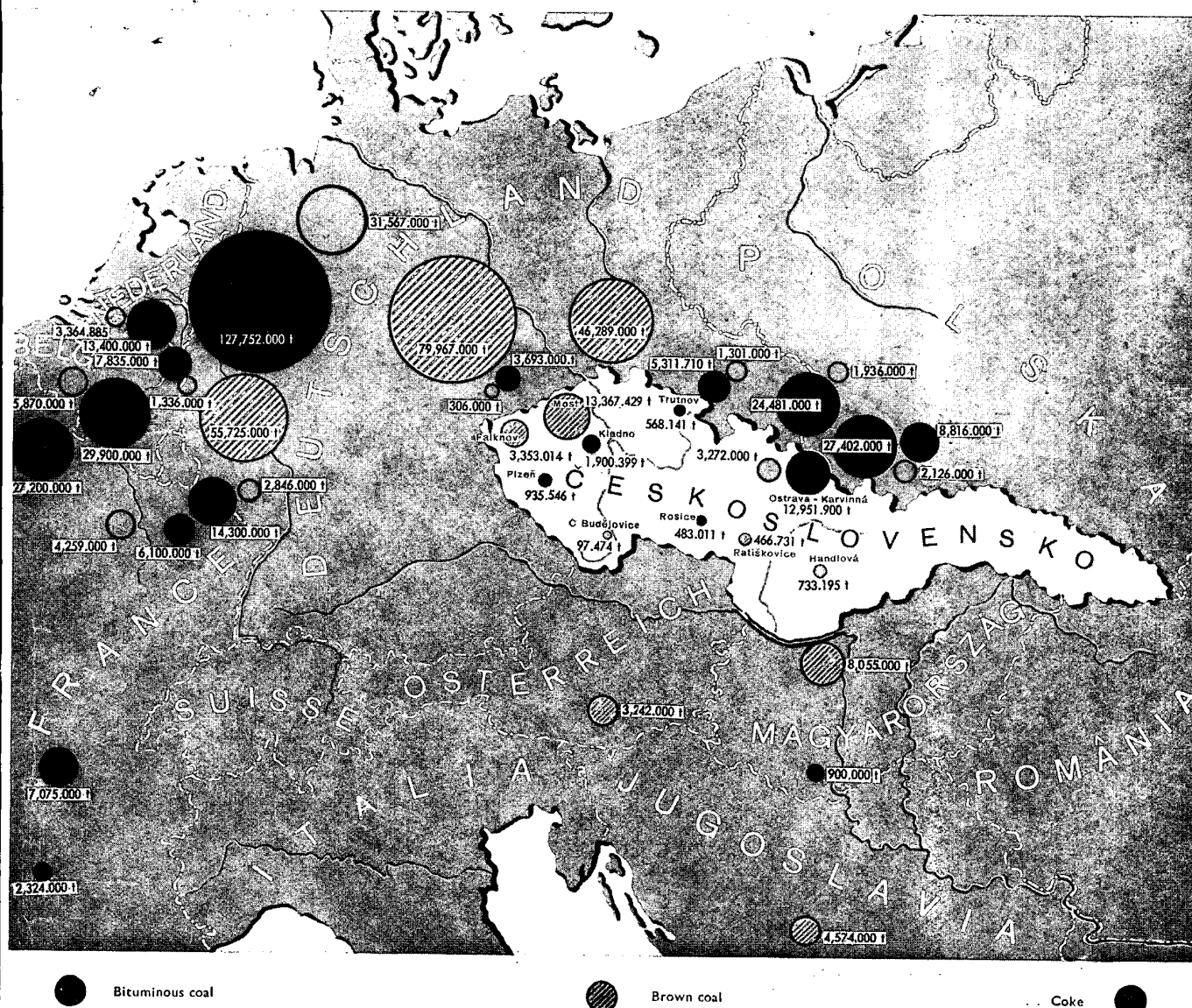
The deposits of uranium ore at Jáchymov have been of importance in connection with the discovery of radium-emanation. Also the graphite-deposits and mines in our country must be mentioned. The production of petroleum and natural gas is still in the state of prospecting and research work and the present production covers only a small part of the total domestic total consumption.

Till a few centuries ago mining activity was entirely concentrated on metal ores. It was coal which changed the aspect of mining itself and of other industries, too. The replacement of charcoal used for iron production, by pit-coal and later by coke gave rise to a new "Iron Age" and to a mass production of coal and iron ores.

In the old days, our ore mining enabled us to reach an adequately respectable position among the industrially developed countries of Europe. In these days, our present industrial capacity, based on self-sufficiency in the consumption of coal and coke, can help us to maintain the same high position.

This is the historical progress and development of our mining industry. The present state of it will be described in the following articles of this publication. Now, let us have a look at the future of our mining.

As far as ore-mining as a whole is concerned, the development will probably follow the existing line, for there is not much hope that even the extensive research and prospecting work, planned for the future, could bring us any astonishing surprise in respect of discoveries of some new, rich deposits of ores. However, the bituminous and brown coal mining will remain of predominant importance. All our mining industry, especially the coal-mining industry, faces difficult problems and tasks.



Coal output and coke production in Central Europe in 1937.

technological methods like coking, gasification, hydrogenation, synthetic processes, etc.

Last year, Oliver Lyle published in England a treatise in which he analysed several ways of using fuel, and concluded from the results obtained that it would be possible to save about 45 per cent of the present coal consumption if fuel economy was put on a scientific base. Of course, before doing so, immense investments would be necessary. It will take a long time before this revolutionary change in the methods of using fuels will be carried out, but it is necessary to meet this problem as soon as possible.

It would be beyond the scope of this article to deal with this problem in detail, however, let us, at least mention, the main principles along which the solution of this problem lies:

1. Utilization of coal directly on the spot; i. e. as close to the pitheads as possible. The savings gained by eliminating coal transport from collieries to consumers are obvious when it is considered that in every truck of coal of poor quality (e. g. brown coal, lignite, etc.) we transport a considerable portion of mere ballast (30 to 50 per cent, and sometimes even more, of ash and water). Instead of this, the energy, in the form of electricity or gas, could be delivered from coal mines to consumers in an easy and economical way.

2. The building of additional thermal power plants using fuel of poor quality.
3. The construction of gasification plants and the extension of long-distance gas supply network.
4. The technological treatment of appropriate sorts of coal in order to obtain all important products.
5. The extension of electricity and gas utilization (including the electrification of the railway system).
6. To effect full use of energy and a progressive elimination of all wastes.

The solving of these problems depends predominantly on the power and chemical industries. Of course, the mining industry must cooperate with them, especially in the planning of coal production; and that even for the very reason that the mining industry itself is responsible for the economical exploitation of our coal resources, which are estimated to last for 150 to 200 years. The comparison of these reserves with the production capacity and its ascending tendency makes the importance of the problem quite clear. Of the countries of Central Europe only Poland has more favourable natural conditions.

Probably, at no great distance, the atomic age will bring us the solution of many problems in the field of energy sources. Yet, also in such a case it will be necessary to



regard coal as a valuable raw material which must be economized in all possible ways.

In its history, Czechoslovak mining passed, not only through many periods of prosperity, but also through periods of decline; the latter being often in direct connection with state historical crises, or wars.

However, on the whole, it has kept pace with the advance of civilization and often placed itself in the frontline of

technical, economical, social, and – consequently – also spiritual progress.

I just want to emphasize the spiritual progress, which we have achieved because, as the nation of John Hus, Peter Chelčický, John A. Komenský and Thomas G. Masaryk, we have used our sources and abilities in the service of the great ideals of liberty, peace and humanity. And so it will be for ever.

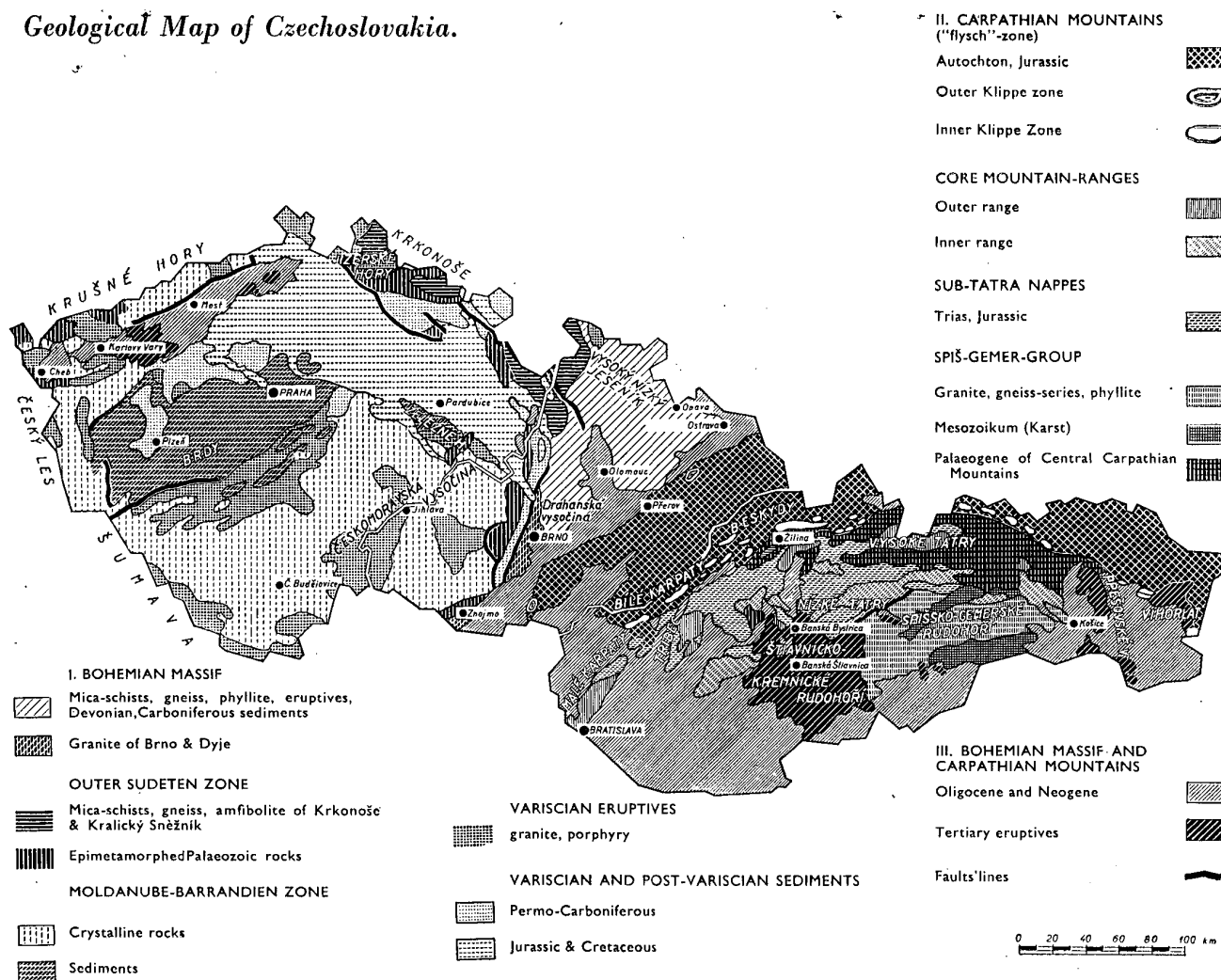
ING. JAROSLAV WURM.

*Heavy industry in the Ostrava-Karvinná coal district.*





## Geological Map of Czechoslovakia.



## The Mineral Resources of Czechoslovakia.

2.

The territory of the Czechoslovak Republic belongs in respect of its geological structure to the two principal mountain systems: the Bohemian Massif and the Carpathian Mountains. Both these systems are by their different composition easily distinguishable even on the many-coloured general geological map. These two tectonic units differ also in their fundamental features, different extents, and character of deposits of useful minerals, and so, also in this way, we are able to distinguish them.

**THE BOHEMIAN MASSIF**, forming the western part of Czechoslovakia, is characterized chiefly by deposits of bituminous coal, anthracite, lead-silver, and tin-tungsten ores of older geological periods.

**THE CARPATHIAN ARCH**, situated in the eastern part of Czechoslovakia, contains characteristic iron-ore deposits of the carbonate formation, and in its younger mountain-ranges there occur petroleum, and gold and silver-bearing ores.

For both these tectonic systems there had been a common geological evolution in some of the later periods.

**THE BOHEMIAN MASSIF** occupies the Bohemian country and a part of Moravia and Silesia up to a line running approximately from Znojmo over Brno and Přerov to Ostrava. In the whole structure of this system predominate the remaining fragments of old mountains-ranges of primordial depositional character, which was obliterated by the Palaeozoic Hercynian folding. These mountain-building processes attained their maximum intensity in the Carboniferous period and were accompanied by powerful abyssal volcanic action and by intrusions of porphyry, granite and basic rocks as well as by the metamorphosis of the older sedimentary strata into crystalline

schists. In this way the high zonal Hercynian mountain-ranges were formed, which were exposed to the influence of intensive erosion and were rapidly denuded to their base. The material of eroded rocks filled in the basins and in this way the Post-Hercynian cover originated.

The crystalline rocks of the Moldanube-Barrandien zone, intensively metamorphosed, extend over the whole of South Bohemia including the Bohemian Forest (Šumava) and the part of Central Bohemia from Brdy to Železné Hory (Iron-Mountains) as well as over the predominant part of Českomoravská vysočina (Bohemia-Moravian Highland) to the Žďár hills (Žďárské vrchy) and the "Boskovice Furrow". Also the granite massifs of the Bohemia-Moravian Highland, the Central Bohemian massif, and the massif of Třebíč-Mezitřetí, and numerous volcanic extrusions of basic rocks belong to this zone.

In this zone originated numerous siliceous ore veins containing *gold* (Jílové, Nový Knín, Liběnice, etc.), the veins of *lead-silver*, *arsen*, *antimony* and *pyrite ores* (Kutná Hora and the zone stretching from Havlíčkův Brod over Jihlava to Telč and from Mladá Vožice over Tábor to České Budějovice). Here the important deposits of South Bohemian

*crystalline graphite* occur, and in the serpentine island near Český Krumlov the deposit of *nickel ore* is to be found. *Iron ore* beds occur in Central Bohemia, at contacts with igneous rocks; in the Moravian area this crystalline zone contains worthless occurrences of *magnetite* of the "skarna" type, and also *haematite*, *graphite*, and in the serpentine rocks *chromite* and *magnetite*.

The crystalline rocks of the same zone border the western frontier of the country in the region of the Bohemian Forest, Smrčiny, Tepelské vrchy (Teplá hills) and form the structure of the Ore-Mountains (Krušné Hory). The Ore-Mountains used to be an important silver mining district. Once the most important place of rich *silver ore* deposits became famous by later discovery of *uranium* ores. The *tin* and *tungsten* ore deposits in the Ore-Mountains laid the foundation for mining in very early days. Perhaps, the tin, contained in prehistoric bronze, came from the ancient mines in the Ore-Mountains. Isolated occurrences of *iron*, *manganese*, *molybdenum*, *copper*, *cobalt* and other ores are also to be found here.

The most northern geological unit of crystalline schists is the, so called, outer Sudeten zone of the Jizerské hory

*Graphite-mine in Moravia.*



(Jizera Mountains) and of the Krkonoše (Giant Mountains). The *iron ore* deposits are bound on the phyllites and granite-gneiss of the Giant-Mountains. The farther geological unit is formed by the gneiss vault of Orlické hory (Orlice Mountains) and by the mountain-range of Kralický Sněžník with intercalations of crystalline limestone and with important deposits of *amorphous graphite* in the neighbourhood of Staré Město. The occurrences of *magnetic iron ore* as well as those of *antimony ore* and *pyrite* are of only little importance.

The crystalline schists of Vysoký Jeseník are separated from the mountain-range of Kralický Sněžník by the "Ramzová" tectonic line. Over the gneiss, mica-schists and amphibolites of Vysoký Jeseník transgress the strata of *Devonian* and *Carboniferous* formation. Hence, in a southern direction, behind the Upper Moravian valley, the Devonian rocks appear in a streak of isolated islands emerging from the Kulm cover of Drahanská vysočina. Finally, in the vicinity of the eruptive *massif of Brno*, which preserved its original tectonic character from the Pre-Devonian time, the Devonian formation consists of a mighty limestone cover of "Moravian Karst", which is known by typical, extensive Karst phenomena. From the Kulm strata of slates and greywacke of Nížký Jeseník, there are, at some places, outfolded the Devonian footwall strata in the second stripe, stretching from Šternberk to Horní Benešov. The scanty *gold* occurrences are bound on the crystalline and eruptive rocks of Vysoký Jeseník. The *iron ore* occurrences of this region are highly metamorphosed. The Devonian beds contain more extensive *iron ore* deposits, which originated by sedimentation at a time, when diabase and diabase-tuffs extruded under the sea. By later orogenic processes the ore deposits were transformed; at some places into magnetite, at others into haematite. In this way originated the occurrences of *magnetic iron ore*, mined once at Konice in the district of Drahanská vysočina, the deposits of haematite in the vicinity of Úsov, *magnetic iron ore* deposits near Malá Morávka and Horní Město as well as the *magnetic iron ore* beds near Šternberk and Horní Benešov, where the iron ore is accompanied by minerals of the *thuringite* group. The origin of lodeous *lead-silver-copper ore* in the headlands of Vysoký Jeseník and Nížký Jeseník is attributed to the influence of the diabase eruptions.

The strata of the Kulm formation pass in an easterly direction into the Upper Carboniferous sediments of the *Ostrava-Karvinná coal field*, which is the south-eastern extremity of the large Upper Silesian coal basin. Owing to its origin from coastal swamps in the immediate vicinity of the sea, the strata of this paralic basin contain marine intercalations. The Ostrava-Karvinná coal district is, by its coal output and by its coal resource, the industrial basis of our whole country.

The Moldanube-Barrandien part of Central and South-Western Bohemia also contains a zone of unmetamorphosed Algonkian and older Palaeozoic sediments.

The "*vitriol*" *shales*, which are developed mainly in the northern vicinity of Plzeň, belong to the middle stage of Algonkium. Fuming sulphuric acid was produced from these shales until quite recently.

In the older Palaeozoic formation the veins of *lead-silver* and *antimony ores* and *pyrite* of the Příbram ore-bearing region penetrate through the strata of the Cambrian rocks at Brdy. These veins are genetically bound on the granite *massif*, in a similar manner as the ore occurrences in the ore-bearing district of Stříbro. The lower Silurian strata contain important deposits of *iron ores*, *red iron ore*, and of solitic *chamoisite* of Nučice, which all originated by sedimentation during the period of diabase intrusions under the sea. In the northern part of Železné hory (Iron-Mountains) a deposit of *manganese ore* is bound on the sedimentary, unmetamorphosed zone.

After the Old-Palaeozoic sea had regressed, the *depression basins* of the subsided and levelled Hercynian mountain-

range were filled in by fresh-water sedimentary material of Carboniferous and Permian origin. So in the *younger Palaeozoic period* the deposits of *coal* were being formed in the *limnic* basins of Rakovnick-Kladno and of Plzeň with inferior, smaller coal deposits, and in the inner Sudetic part the coal basin of Svatoňovice-Zácléf, which is a part of the Waldenburg coal basin. In this period, also the *anthracite* occurrences in Bohemia had arisen. A narrow depression-zone of the "Boskovice Furrow" originated between the crystalline Moldanube mountain-range of Českomoravská vysočina (Bohemia-Moravian Highland) and the *massif of Brno*. This depression zone was also filled up by the limnic sediments of the coal basin of Rosice-Oslavany. It is possible to trace the tectonic connection of the "Boskovice Furrow" from Moravský Krumlov to Jevíčko, where it is partly covered by Cretaceous beds. The former volcanic activity is obvious from the effusions of porphyres and melaphyres in the Permian headland of Krkonoše, and its influence appeared here in the effect of *copper-bearing solutions*, which transformed the Permian clayey schist into copper ore.

In the Middle Cretaceous period the extensive territory of Bohemian Massif sank and was covered by sediments of Cretaceous sea. The upper *Cretaceous beds* contain *coal* seams having features of lignitic coal. These seams are mined at only a few places of Českomoravská vysočina, together with the hangwall fireclay.

THE CARPATHIAN MOUNTAINS - geologically a young, folded mountain-range - are the direct continuation of the Alpine system, which in the eastern part of Moravia joins the Bohemian massif by its wide "*flysch*" zone and forms the base of the geological structure of the whole of Slovakia. The small deposits of *iron ores*, *pelosiderites*, are bound, at the headland of the Beskydy mountains, on the beds of this outer "flysch" arch. These iron ores gave rise to the Moravia-Silesian iron industry. The *inner klippe-zone* is here represented by limestones, stretching from Pálavské kopce to Štramperk. The inner zone is formed by limestone klipps from Pováží over Orava to Šaryš. The Secondary complexes of limestone, marl, and dolomite are joined to this zone; from the complexes the mountain-ranges of crystalline schists and granite rise in two-lines in the Carpathian direction. These mountain-ranges originated by vigorous folding action during the Carboniferous period. In the carbonate strata of the western part of the Secondary zone there are smaller occurrences of *manganese ores*, *bauxite* and *asphalt*, and isolated, occurrences of *zink*, *lead* and *arsenic ores*.

To the outer row belong the mountains of little Carpathian, Inovec, Suchá, Little Magura, Minčol, Little Fatra and High-Tatra, to the inner one the Tribec, Low Tatra, Branisko and Zemplin island. To the south of the inner row lies an extensive territory of Old Palaeozoic formation, the *Spiš-Gemer Ore-Mountains* and the Vepor mountain-range. These old series of beds suffered, at the end of the Carboniferous period, an intensive folding which was accompanied by a rising of granite and other eruptive rocks. At the same time, the fundamental tectonic units of Carpathian structure were formed, and in the thermal phase of volcanic activity originated important lodeous deposits of *siderite*, *manganese ore* and *ankerite* in the Spiš-Gemer Ore-Mountains, accompanied by occurrences of *haematite* and different sulphide ores of *copper*, *antimony*, *mercury* and *cobalt*. As well as ores, veins of *baryte* and beds of first-grade *magnetite* and *talc* also occur here. The Carboniferous strata of the Zemplin island contain unworkable, thin seams of coal. At some places, Secondary limestone complexes remained preserved; among them the Slovakian Karst, South-Slovakian Karst and the Liptovské pohoří (Liptov Mountain-Range) are known by their extensive Karst-phenomena. A further folding in the Cretaceous period again lifted some parts of the Palaeozoic mountain-range, chiefly the ones of the inner zone. During the vigorous, Tertiary folding action the cover-shaped structure of the

Carpathian Mountains originated, and the mountain system assumed its definite character.

Towards the Hungarian Plain, Slovakia is bordered by young, volcanic, Tertiary mountain-ranges of the Štiavnica-Kremnica Ore-Mountains, Slánské vrchy, and to the East of Hornád thrust-fault by the Vihorlate mountain-range. The andesite and rhyolite covers, in the vicinity of Štiavnica and Kremnica, were decomposed and propylitized by thermal waters. At some places veins of young formation were formed, with rich silver, lead, zinc, copper and gold-bearing ores. In the East Slovakia district the metalogenesis of eruptives was limited to the forming of only small veins of auriferous antimonite and cinabarite deposit in the promontory of Prešov Hills.

The immediate contact of the Carpathian system with the Bohemian Massif is mostly covered by the Neogene, marine beds of the *Wien basin* extremity, which covers the lowlands of South Moravia and West Slovakia. This region contains deposits of petroleum and natural gas, which from here also accompany the "flysch" arch further towards the north and east. The older Tertiary strata in the "flysch" facies contain the syngenetic deposits of manganese ore, chiefly in the region north-east of Poprad.

The Tertiary era was a time of tectonic and volcanic activities also for the Bohemian Massif.

The rift-depressions of the Sub-Ore-Mountains district are filled up by the Tertiary fresh-water sediments and form the three important brown-coal basins of Teplice-Chomutov, Falknov-Loket and Cheb. In Silesia, a small brown-coal basin near Serksdorf was preserved. The Tertiary strata contain lignite seams in the Budějovice lignite-basin and in the vicinity of Třeboň, in South Bohemia; in North Bohemia near Hrádek n. Nisou and Gersdorf.

In the Carpathian system there originated in the older Tertiary period a little brown-coal basin near Velká Toraň, in the younger Tertiary the brown-coal basins of Handlová, Nováky, Badín, Obyce, Račovice, Modrý Kameň, etc. The youngest are the Tertiary lignite seams of South Moravia. The Handlová Hills continue even under the covers of Tertiary eruptives. The salt deposit near Prešov is bound on the younger Carpathian Tertiary.

The grid of water streams slowly began to develop in the Bohemian Massif and Carpathian Mountains at the end of the Tertiary era. The beds of the streams rising in the gold-bearing districts were bordered by alluvial sediments of gravel and sand with gold content. However, as in other countries of old culture, our placer deposits are exhausted.

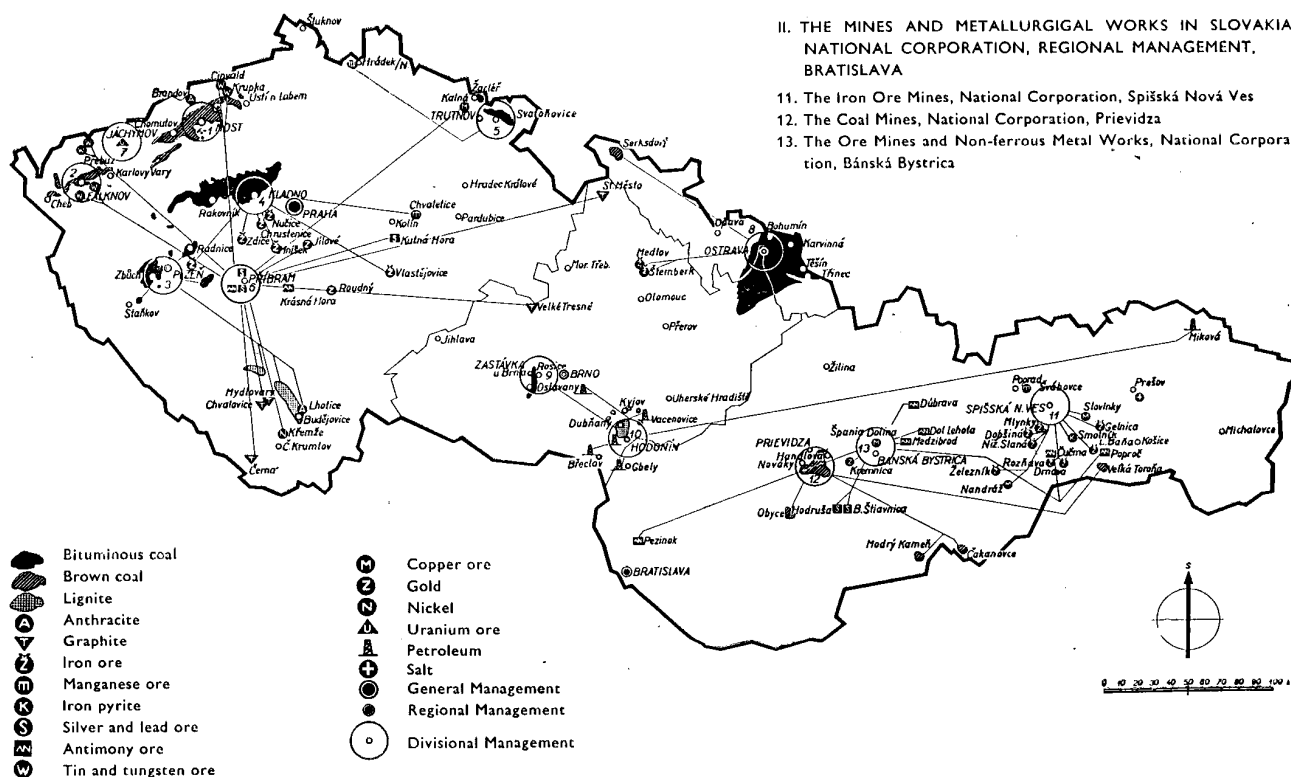
ING. LADISLAV MACEK.

Exploration drilling for coal.



## Organization of the Czechoslovak Mining Industry.

- I. THE CZECHOSLOVAK MINES, NATIONAL CORPORATION, CENTRAL MANAGEMENT OF MINING INDUSTRY, PRAGUE
  1. The North Bohemian Brown Coal Mines, National Corporation, Most
  2. The Falknov Brown Coal Mines, National Corporation, Falknov
  3. The West Bohemian Coal Mines, National Corporation, Plzeň
  4. The Central Bohemian Coal and Iron Ore Mines, National Corporation, Kladno
  5. The East Bohemian Coal Mines, National Corporation, Trutnov
  6. The Příbram Ore Mines, National Corporation, Příbram
  7. The Jáchymov Mines, National Corporation, Jáchymov
  8. The Ostrava-Karvinná Bituminous Coal Mines, National Corporation, Ostrava
  9. The Rosice and South Moravian Coal Mines, National Corporation, Zastávka nr. Brno
  10. The Czechoslovak Petroleum Works, National Corporation, Hodonín
- II. THE MINES AND METALLURGICAL WORKS IN SLOVAKIA, NATIONAL CORPORATION, REGIONAL MANAGEMENT, BRATISLAVA
  11. The Iron Ore Mines, National Corporation, Spišská Nová Ves
  12. The Coal Mines, National Corporation, Prievidza
  13. The Ore Mines and Non-ferrous Metal Works, National Corporation, Banská Bystrica



## The Organization of the Czechoslovak Mining.

3.

In our Country mining has a full history and it played an important role even in the early days and mostly in the Middle Ages. In the 13th and 14th centuries the oldest written Mining Law in Central Europe was codified for our mines. It was then that the names of the mining towns Jihlava, Kutná Hora, Banská Štiavnica, and later Jáchymov, became famous in the history of our mining.

In those days mining in our country was carried out on the principle of Mining Royalty (Bergregal), according to which the right to search for certain useful minerals and to exploit them – in the Middle Ages ores were of chief importance – was excluded from the land owner and were the right of the king or ruler, who in the form of various privileges transferred this right upon other people, mainly upon the nobility and towns' people. He also issued mining regula-

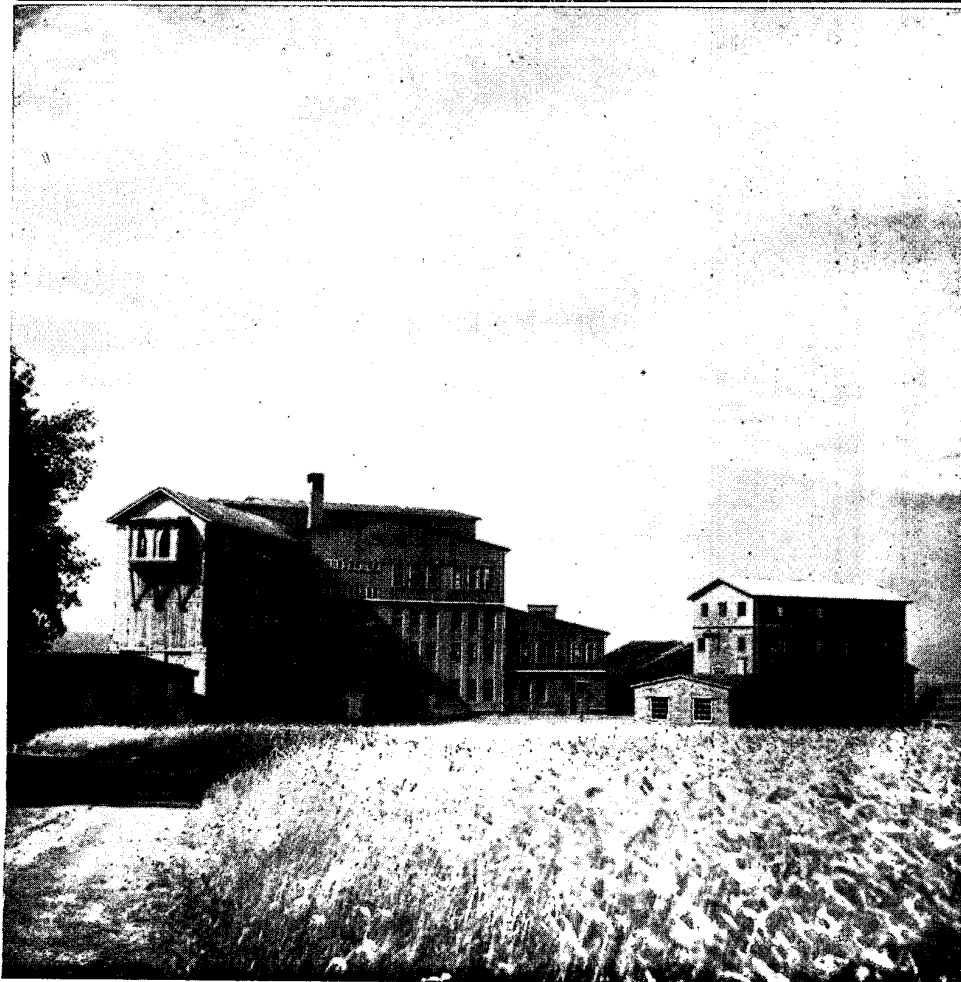
tions, rules, statutes or sanctions, or authorised them to do so, under certain restrictions and regulations.

The sovereign's right to dispose of reserved useful minerals remained, in principle, from the Middle Ages to recent times; the supremacy of State took the place of that of the sovereign, and the number of those, who could then obtain the mining privileges was, of course, more generalized and determined by legal conditions.

The nationalization of our mining industry, realized by the Decree of the President of the Republic in the year 1945, presents in fact a consequent realization of the Mining Royalty; here the State reserves for itself the right to operate all mines and carries on mining in specially organized forms, namely in the National Corporations, which, though being the property of the State, represent indepen-



*Tin-ore mine.*



*Ore-dressing plant.*

dent production units having a position of independent legal corporation, and the activity of which should be directed by principles of a private enterprise.

The National Mining Corporations (Divisions) were formed in accordance with the Nationalization Decree by the Ministry of Industry, in Slovakia in agreement with competent Commissioners, and were organized in the same way as the National Corporations of other branches of industry, namely on the principle of a horizontally organized structure, so, that from former combined and vertically organized industrial concerns the mines had been excluded and incorporated into the National Mining Corporations, which were created according to their type of production and location.

As the former property boundaries disappeared by nationalization, exclusively the technical and administrative respects were decisive in the organization of the National Corporations. By the creation of National Corporations the aim, which the Mining Law had tried to approach by establishing Mining District Boards, was achieved, amalgamating the mines connected by their natural position, identical ownership, methods of working, etc.

The National Corporations were created from the properties of the nationalized mining concerns, i. e. from the mines and adjacent coke, briquetting and power plants and other auxiliary equipment. They are marked on the map on page 15.

It has been seen that the managing offices of the National Corporations have their seats at the mining plants or as close to them as possible. The title of each corporation roughly indicates the subject of its production (coal-mines, iron ore mines, etc.) and also the extent of the corporation, which is mostly limited to the natural boundaries of the deposit, which it should exploit.

Most scattered are the mines and works belonging to the administration unit "The Příbram Ore Mines, National Corporation", at Příbram. This is due to the dispersed location of numerous ore and graphite deposits which belong in its sphere of administration and exploitation. To this corporation are added all nonferrous ore and graphite mines in Bohemia and Moravia with exception of the iron ore mines, which in Bohemia are managed by the Corporation at Kladno, and in Moravia-Silesia by the Corporation at Ostrava. The lead and silver smelting works, which are connected with the lead and silver mines of Příbram mining district, belong to the Příbram Ore Mines, National Corporation.

All the nationalized petroleum enterprises of not only Moravia-Silesia, but also of Slovakia, were incorporated in the National Corporation at Hodonín in order to achieve economic concentration of administration and management of all petroleum plants.

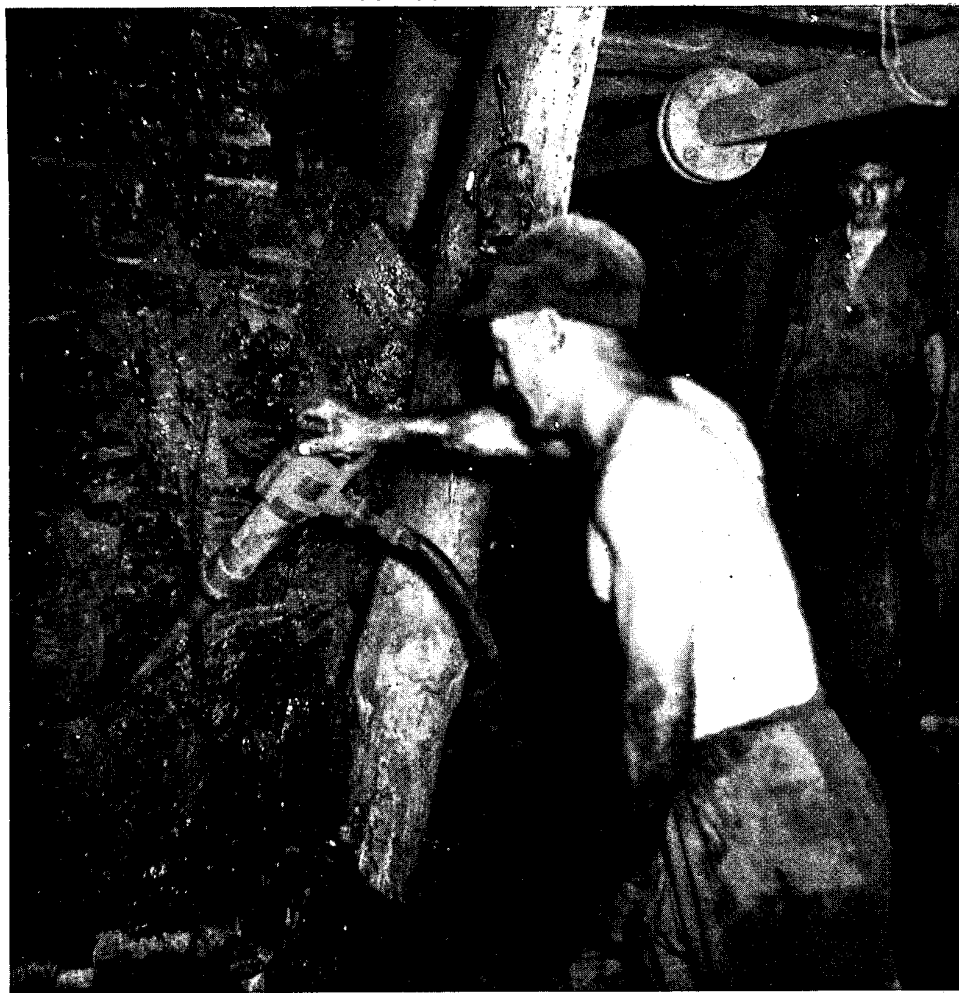
Beside these production units - National Corporations - there is, in accordance with the Nationalization Decree, a central administration unit set over the national corporations, namely the central board for the whole Czechoslovak mining industry - "The Czechoslovak Mines, National Corporation", with its registered office in Prague. To this central board is also subordinated the regional board, set over all Slovak mining industry - "The Mines and Metallurgical Works in Slovakia, National Corporation", with its registered office in Bratislava. The central board as well as the regional board were formed to unify the management and to provide common affairs of all the national corporations of the mining industry. The sphere of activity and the mutual relations of the national corporations was defined by a statute issued by the Government.

The administration of the national corporations is carried on by the Management Committee (board of directors), partly elected by employees, with a director as chairman. The chairman represents the national corporation and, in some cases, he can stop the decisions of the committee or can, by himself, adopt necessary measures, about which, of course, he has to inform the committee additionally. The same is the case with the central and regional board. The internal structure and organization of the national mining corporations is arranged so that their managements can be able to fulfil all tasks given them by the statute. The arrangement of individual organization components is not uniformly determined, but must be in accordance with the extent and local conditions of each individual corporation. The lowest organization unit here is the mine, which is under the control of the national corporation. The management of each corporation is usually divided into 3 or 4 groups or sections, namely the planning, technical-operative, administrative, and social-political section. Special stress is laid on research work and on the mechanization of mining operations. Research and mechanization work is carried out by a special section attached to the central board (General Management) in Prague. Extensive corporations with a large number of mines and plants (coke-plants, power-plants, etc.) have special group-managements, which control the technical operations of the whole group.

The distribution of coal is concentrated in a special section - The Central Coal Sales Department - which is a part of the central board in Prague. This department carries out the distribution of coal, coke and briquettes, partly by means of its own branch sale offices, located in centres which have a large consumption, and partly by means of private coal dealers and co-operatives. In Slovakia, the coal distribution is organized and carried out by a selling office attached to the regional board in Bratislava.

ING. JUDr. JAROSLAV PŘÍKOP.



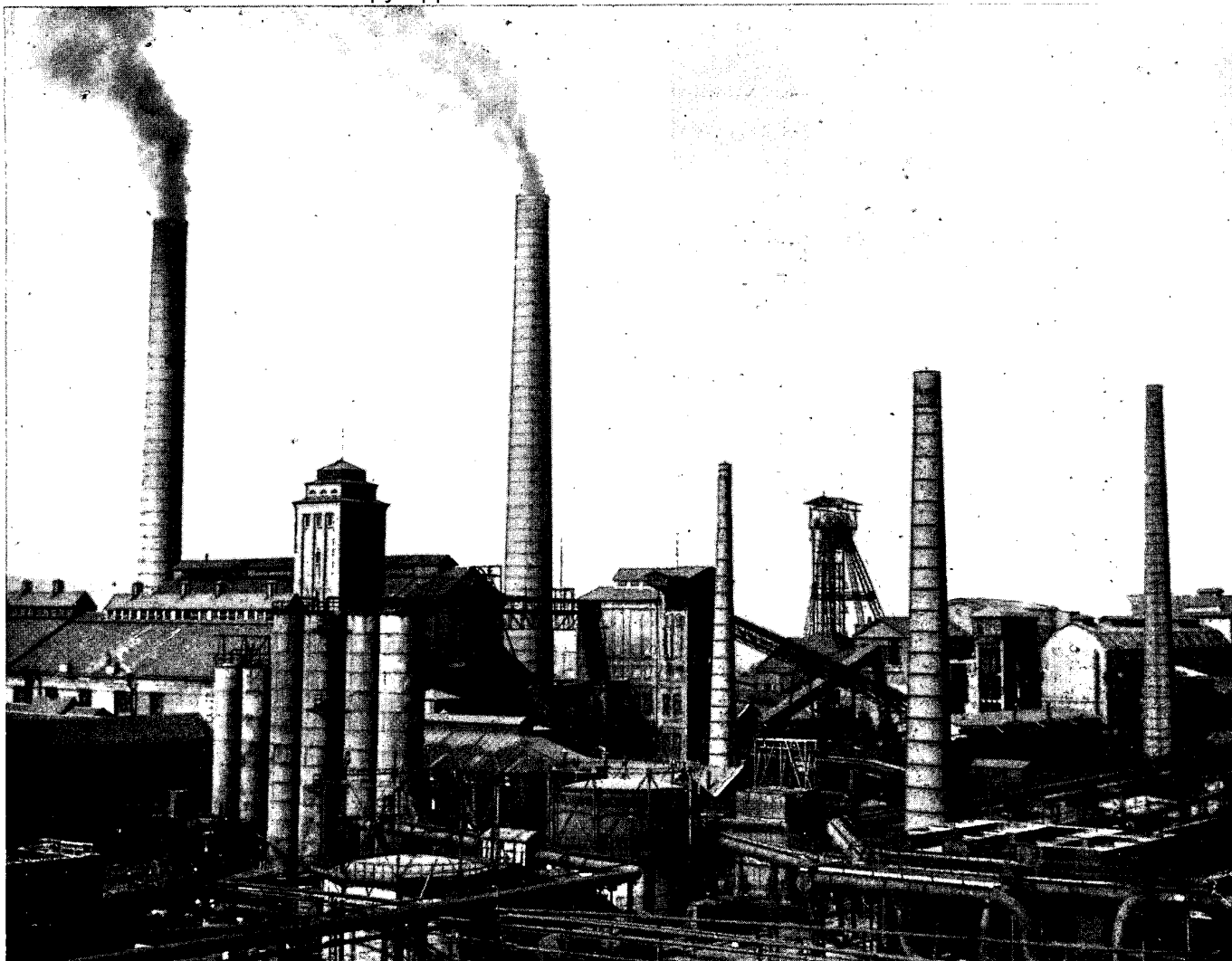


*Working the coal.*



*Supporting the roof by timbering.*





*One of the Ostrava bituminous coal-mines.*

## **Bituminous Coal and Coke in Czechoslovakia.**

**4.**

In all countries of the world, except U.S.A. and U.S.S.R., a decline in coal production is to be observed since the last war. The principle reason for this fall is the shortage of manpower in mining, caused by the preference for other types of work rather than the arduous underground life of a miner.

It is the postwar want of coal, and above all of the bituminous coal, that in Czechoslovakia, as elsewhere, the attention of the whole nation is directed towards the coal industry. It is hoped that by meeting the required coal output scheme, other branches of industry will be enabled to develop and so the desired material prosperity of our nation will be reached and the economical foundations of the country strengthened.

There is no doubt that bituminous coal presents a wide base for the development of our heavy industry, namely those of a metallurgical, chemical and metal nature.

Though the Czechoslovak Republic is relatively rich in the occurrence of bituminous coal, only the coalfield of Ostrava-Karvinná ensures the industrial development of our country in the distant future.

This coalfield was discovered by chance about 180 years ago. It is in fact the southeastern extremity of the known Upper-Silesian Coal Basin and represents about one tenth of the whole. This discovery led to the unexpected development of this economically most important industrial district of Czechoslovakia. It was particularly during the second half of the last century that the progress was most intense.

The comparative figures of the coal output in Ostrava-Karvinná coalfield to the total bituminous coal production of Czechoslovakia, Europe and the whole world, are shown in the following table:

Year	Output of bituminous coal in million metric tons			
	Ostrava-Karvinná coalfield	Czechoslovakia	Europe	World
1913	9,18	14,09	603,4	1 216,3
1929	12,49	16,55	636,6	1 325,1
1930	10,67	14,47	597,2	1 216,8
1931	9,56	13,17	547,3	1 071,6
1932	7,73	11,03	505,1	952,1
1933	7,60	10,63	516,1	997,6
1934	7,46	10,79	560,5	1 091,3
1935	7,72	10,89	576,8	1 120,7
1936	8,93	12,23	609,1	1 227,4
1937	12,89	16,77	655,6	1 282,5

It would not be without interest to take into consideration the coal output target which is to be reached within the Czechoslovak Economic Two-Years Plan and to compare the planned figures with those of the output achieved in the years 1937 and 1946.

Principal Czechoslovak districts producing bituminous coal (Divisions)	Output of bituminous coal in metric tons			
	during the years		planned for years	
	1937	1946	1947	1948
Ostrava-Karvinná	12 888 771	11 225 300	12 750 000	13 710 000
Rosice	476 400	331 700	450 000	506 000
Kladno	1 829 289	1 501 005	1 830 000	2 000 000
Plzeň	903 206	637 361	810 000	920 000
Trutnov	568 142	420 612	534 000	610 000
Total	16 665 808	14 115 978	16 374 000	17 746 000

From the preceding table it is evident that in comparison with the output of the Ostrava-Karvinná coal district, the production of other districts is relatively small, being only about 22 per cent of the total production of bituminous coal in Czechoslovakia. Considering that the existence of these districts is rather limited, and their output-capacity will in the process of time decrease, the production of bituminous coal in our country in the next decades will concentrate more and more on Ostrava-Karvinná, which is one of the best technically equipped coal districts in Europe.

In order to meet the demands of the coal market and to make our industry able to compete, it has been necessary to carry out fundamental changes in operating and working methods as far as natural conditions permitted. The former working process, predominantly limited to hand labour, is giving way to the mechanization and electrification of the work underground as well as on the surface of collieries. The laborious, and not very effective, hand work is being replaced by cutting machines, pneumatic picks and drills, and loading machines. The introduction of machines and their extensive use in mining is held up by the general

postwar lack of machinery. The belt and shaker conveyors, the rope and chain haulage systems and other mechanical conveying equipment enable the concentration of working faces as large operation units with maximum output per manshift. More intensive control of mine ventilation and other components of mining operations have been achieved by means of modern working methods. Naturally, these technical developments and improvements in our coal mines have resulted in not only a higher output, but also in raising the grade of safety in the mines, especially of those in which the emanation of firedamp is great and/or the coal is more liable to spontaneous combustion.

In accordance with general development several smaller coal mines, where conditions are unfavourable and arrangement and machinery obsolete, will be closed down, or merged with other mines so as to form greater and more productive units. Only such mines will be able to extract the coal from remaining pillars economically. The concentration of smaller mines into a reduced number of large size mining plants will also allow for more economical surface arrangements, mainly the cleaning, washing and blending plants, which, with the centralization of haulage and winding systems, can be perfectly equipped with machinery according to modern principles of coal preparation.

The bituminous coal in Czechoslovakia, and namely the coal of Ostrava-Karvinná coal district, is mostly of very good quality; the latter yielding coke of outstanding properties. These favourable conditions caused an extensive coke industry to develop in this area. The equipment and the production methods of Ostrava-Karvinná coke plants are on the highest level of carbonization technique and a perfect utilization of by-products and gas forms a wide base of a developed chemical industry. The gas is used for metallurgical, heating and lighting purposes.

The table below shows the coke production in Czechoslovakia since the year 1913.

Year	Coke production in metric tons	Year	Coke production in metric tons
1913	2 562 000	1934	1 344 800
1929	3 163 200	1935	1 551 100
1930	2 712 300	1936	1 955 400
1931	2 045 500	1937	3 279 900
1932	1 277 300	1946	2 249 860
1933	1 258 580	1947*)	3 120 000

\*) Target-production under the Two-Years Plan.

In addition to the coking coal the Czechoslovak mines produce nearly all kinds of coal and so the various demands of the coal market can be met.

The nationalization of the mining industry has founded the necessary suppositions for a planned organization of the coal industry. The production programme, and the investment scheme will no longer be split by the interests of many individual owners. Thus, our coal mining industry will be properly co-ordinated, irrespective of any limitations, which would inevitably follow from individual private ownership and will contribute to the development and prosperity of the whole industry of the country.

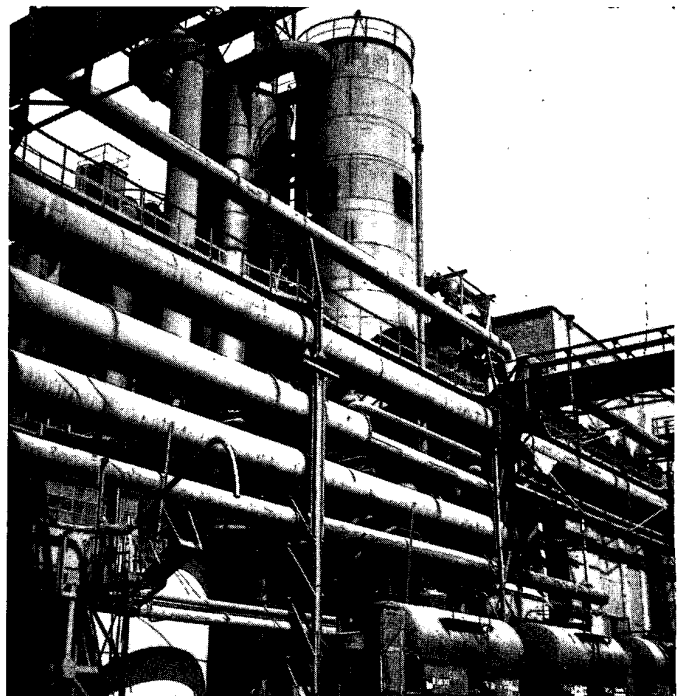
ING. EMIL PETÝREK.

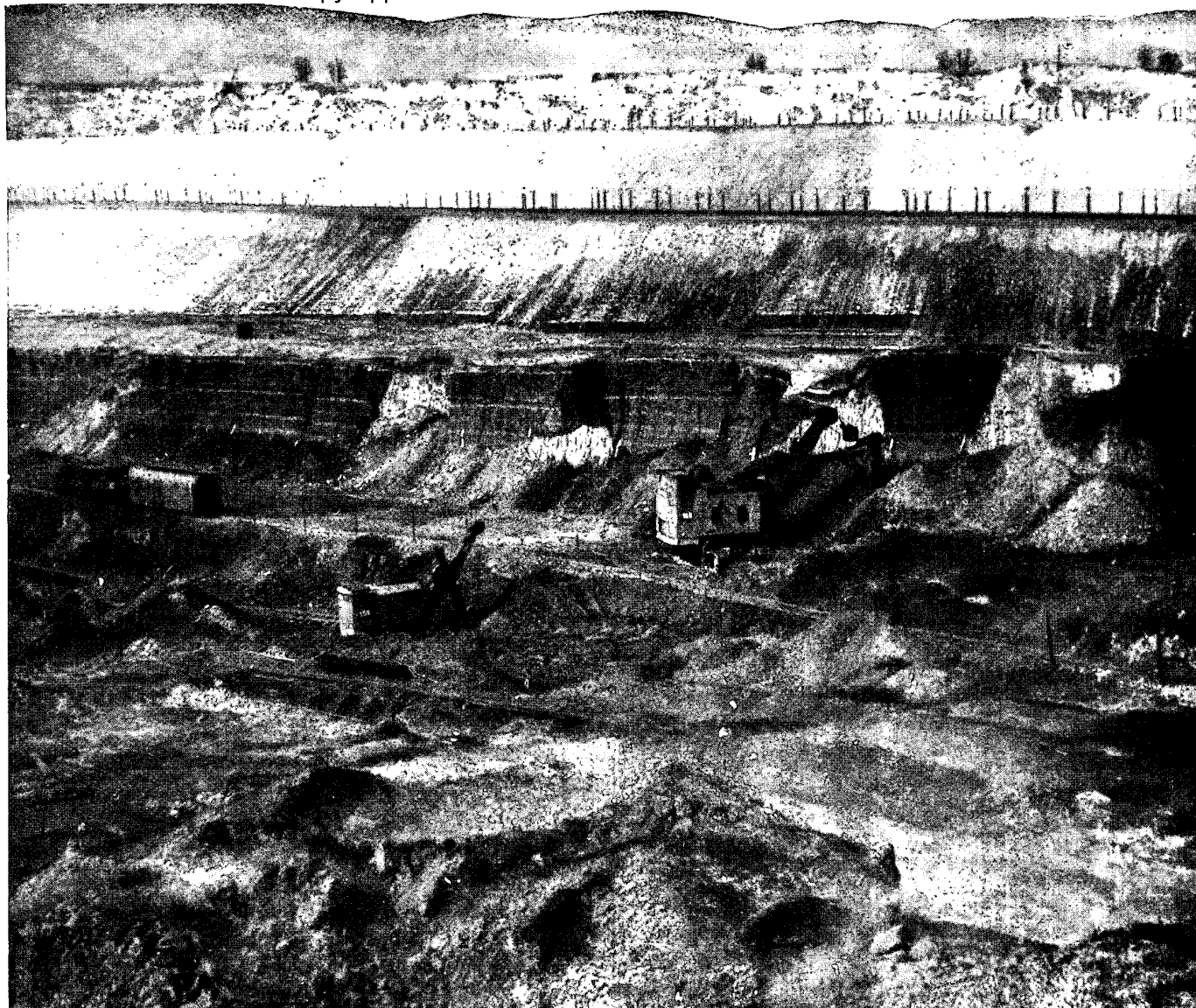


*Filling the coke-ovens.*

*Pushing the coke out of the oven.*

*Coke-plants' chemical production.*

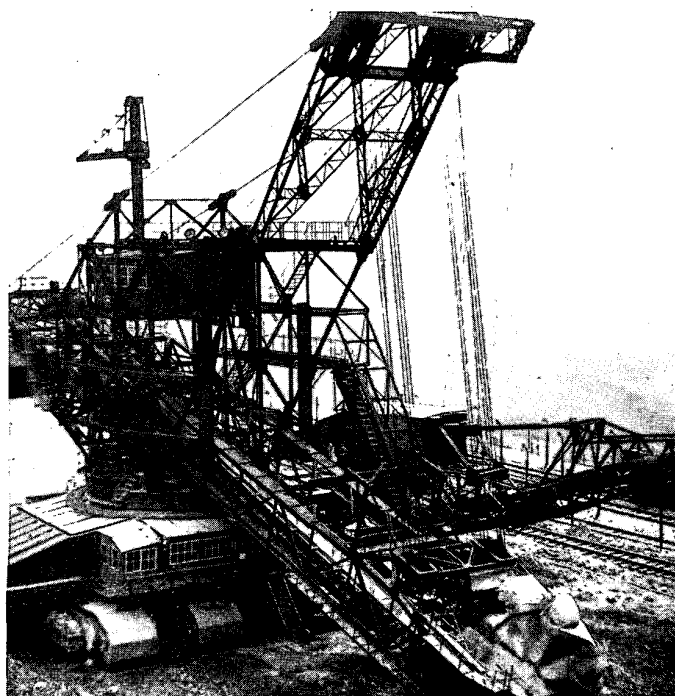


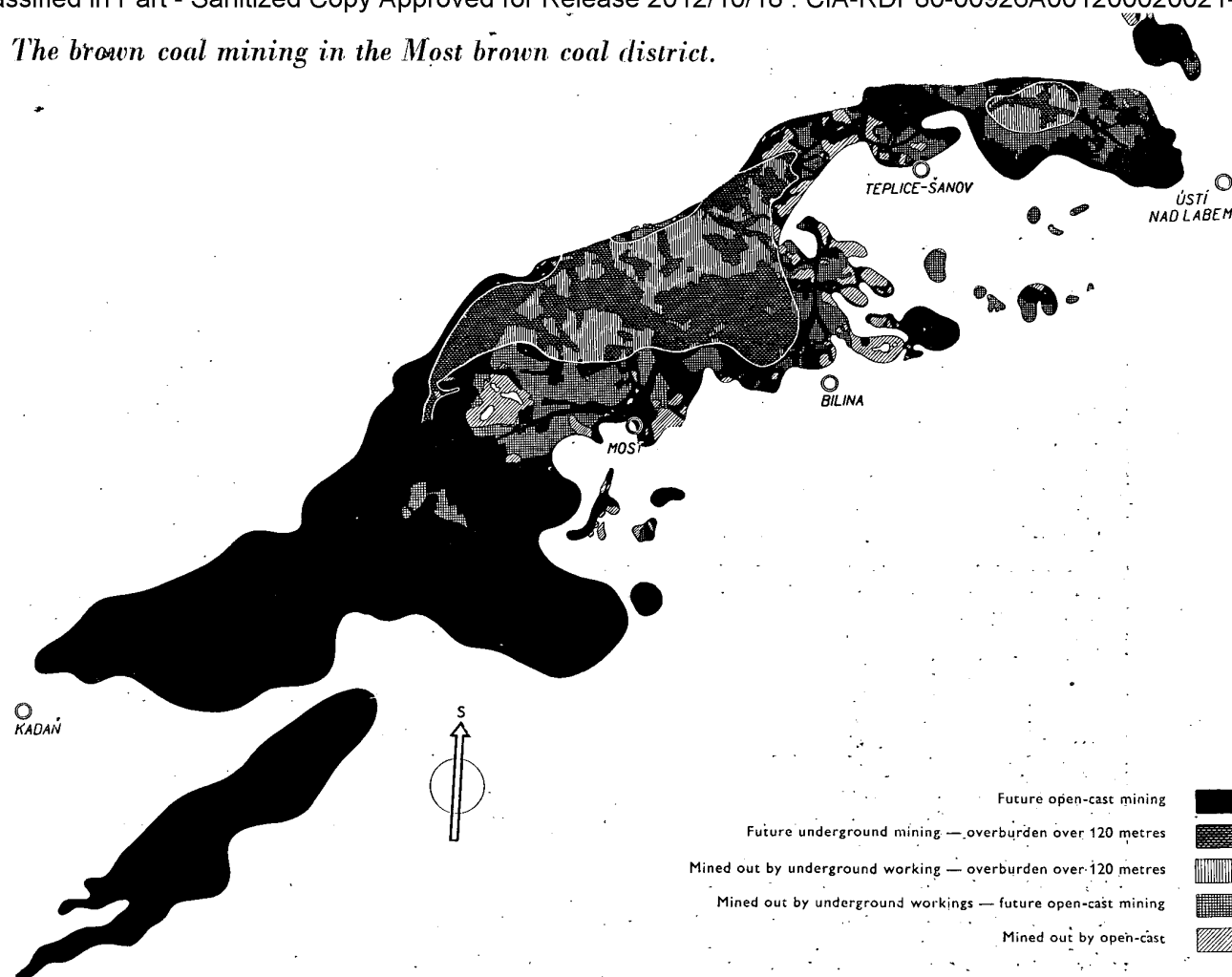


*A part of the largest open-cast brown coal mine in Central Europe.*

*Bucket-wheel excavator.*

*Brown coal excavation by a power shovel.*



*The brown coal mining in the Most brown coal district.***Brown Coal in Czechoslovakia.****5.**

As regards brown coal resources, Czechoslovakia is one of the richest countries in Europe. The brown coal output in Czechoslovakia exceeds the output of bituminous coal and up to 1939 it took second place in Europe. The brown coal output of Czechoslovakia in comparison with that of the World is shown in the following table:

Year	Brown coal output in million metric tons		Percentage of brown coal output to total coal output in the world
	Czechoslovakia	World output	
1913	23,136	128,8	9,6
1919	17,324	132,—	11,3
1929	22,534	232,4	14,9
1930	19,160	197,3	14,—
1931	17,869	184,6	14,7
1932	15,787	172,7	15,3
1933	14,968	177,3	15,1
1934	15,071	191,7	14,9
1935	15,113	205,3	15,5
1936	15,948	225,6	15,5
1937	17,895	254,3	16,5

The brown coal deposits of Czechoslovakia originated in the Tertiary era, chiefly in the Lower Miocene and Upper Oligocene epoch, four to five million years ago, by the transformation of peat-bogs.

The main brown coal deposits are bound on so called Ore-Mountains Fault stretching along the north-western boundary of Bohemia. In this district two brown coal basins had been formed, different in the amount of coal resources, and in the properties of coal deposited.

From the both basins, the larger one, the Most brown coal basin, is by its size and output of brown coal the largest coal basin in Czechoslovakia, it supplies a predominant part of the total brown coal output. It extends between Ústí nad Labem and Kadaň to a distance of about 60 kilometres and is about 12 kilometres wide at its centre, which is in the vicinity of the town of Most. The resources of coal here deposited are estimated at about five thousand million metric tons.

In this district one single seam is deposited which in the greater part of the basin is uniform and undivided. Near the border of the basin there occur in the seam partings, which westward grow thick until they divide the seam into three splits or benches.

At the border of the basin the seam crops out; in the di-

Near the outcrop the brown coal seam has been worked in open-cast mines, after removing the moderately thick cover. Originally, it was possible to apply this method of mining to a depth of a few metres only. The introduction of power excavators in open-cast mining enabled the removal of a much greater thickness of overburden. Before the War, the ratio - overburden:coal seam - used to be usually as 2 : 1; i. e. with a seam 20 metres thick it was economically possible to strip an overburden 40 metres thick. The unstriped coal seam was worked partly by hand, mainly the upper part of the seam often intercalated with layers of fireclay, partly mechanically by means of excavators of different types.

The run-of-mine coal is graded and screened into various sizes by means of mechanical screens. The following sorts of brown coal from the mines reach the market:

Section through the brown coal seam

Fireclay crushing-plant

Coal preparation according to calorific value Komofany

Pure coal

Middle-product

Coal for power-plants

Chemical production

Gas

Distant gas pipe line

Tar products

Producer gas for motor vehicles

Special fuel for domestic grates

Industrial fuel

Fuel for large power plants

Pure coal, small

Fuel for power-plants

Pure coal

Brown coal coke

Middle products from separation plant

Middings



Large (Lumps) - - - - -	over 120 mm.
Cobbles I (Trebles) - - - - -	60/120 "
Cobbles II (Doubles) - - - - -	40/60 "
Nuts I (Singles) - - - - -	20/40 "
Nuts II (Beans) - - - - -	10/20 "
Nuts III (Peas) - - - - -	7/10 "
Dust (Gum) - - - - -	0/7 "

In the large open-cast mines is mined not only clean coal, which does not require any additional preparation, but also an impure coal. In order to be able to utilize also this inferior sort of coal, it is necessary to prepare it. For that purpose a special preparation plant is being constructed close to the large open-cast mines near Komofany, in which as well as the usual sorting equipment there will be a special treatment of coal. The impure coal will be prepared by washing it in heavy liquids, and so, according to specific gravity, clean coal, the middleproduct and dirt will be gained separately. The middleproduct and refuse will be burned in a large electric power plant.

The larger lumps of brown coal are used for domestic heating, the smaller ones for industrial purposes. During the last war a plant was built near Most, in which a part of the brown coal output has been utilized for producing synthetic motor fuels as well as numerous other chemical products. Moreover, a gas plant is attached to this, where the coal is turned into gas by the gazification under high pressure. The gas is distributed by means of a pipe line network system and supplied to many towns in North-Bohemia and lately even to Prague.

An additional rational utilization of brown coal, mainly of the smaller sizes, for which there is not sufficient demand, will be achieved by using it in thermal electric power plants. The mines, which consume a great amount of electric power, run 10 mine power plants of 100 million KWh capacity per annum. Three large power plants have been built as well in Most coal mining district; these deliver electricity to long-distance network. The best known is the power plant at Ervenice, which since the year 1925 has supplied electric power for Prague and was built in order to utilize the inferior coal of Hedvika mine. All these powerplants are now increasing their production capacity and under a proposal of the Two-Years Plan a further huge power plant is to be built, which could utilize the refuse from preparation plant attached to new open-cast mines.

In the Most coal field there are at present 53 brown coal mines in operation, and the "North-Bohemian Brown Coal Mines, National Corporation" was formed after the nationalization, and established at Most. By the nationalization the mine properties were concentrated and thus it was possible for a uniform planning from the stand point of interests and needs of the whole coal district.

The second and smaller brown coal basin of Falknov spreads between Karlovy Vary and Cheb for about 30 kilometres with a maximum width of 8 kilometres. In this basin three seams are deposited, which are of various thickness and of different bedding conditions and properties of coal.

The upper seam "Antonín", 15 to 30 metres thick, is deposited 14 to 180 metres deep. The calorific value of this coal is 3,200 to 3,500 calories.

The middle seam "Anežka", 2 to 8 metres thick, contains coal of higher calorific value, 4,200 to 4,500 calories. This seam is developed only in the western part of the basin and is greatly mined out.

The lower seam "Josef", developed only in a form of irregular small beds in thickness of 2 to 10 metres, has coal of 3,500 to 4,500 calories.

The resources of this second brown coal basin are estimated at 800 million metric tons, from which 3/4 falls on the seam "Antonín". The Falknov brown coal basin produces at present about one fifth of the total brown coal output in Czechoslovakia.

The coal seam is worked here, as in the Most basin, partly in deep mines, partly in open cast mines. Here also the open cast mining is going on at greater depths than previously. From the total output 54 per cent of coal is won in open cast mines, whereas before the war this proportion was only 30 per cent.

According to the quality the Falknov coal is divided into five price classes. The calorific value of larger sizes varies from 3,100 to 4,700 calories. The run-of-mine coal is rather wet; some sorts having up to 45 per cent of moisture content. The small coal of size 0/12 mm, called "grits" contains generally more ash. The proportion of this small coal to the total output is considerably high, chiefly in open-cast mines, where it reaches up to 40 per cent. In underground mines the small size coal usually does not exceed 25 per cent of the total output.

By the properties mentioned the Falknov coal is predestined for utilization in the home district itself. It was these conditions that gave origin in this district to well developed, chemical, ceramic, and glass industries. The small kinds of coal, mainly of inferior quality, is used for generating electric power. Three thermal power plants, belonging to the mines, have an annual capacity of about 50 million KWh. The power plant in Dolní Rychnov with a capacity of 30,000 KW, belongs to the nationalized power industry. For domestic heating the coal is briquetted; the briquettes having lower moisture content and higher calorific value. The brown coal of Falknov is easily made into briquettes without the addition of any binding material. At present there are five briquette-plants in operation and a new, large one is under construction.

The increasing proportion of small coal to the total output calls for the possibility of finding new uses for it. It seems to be most suitable to convert it into gas and distribute it by means of the far-distance pipe-line system.

In the "Jan" mine at Pila, "wax" coal is won, from which montan wax is extracted in one of our own plant.

In the Falknov brown coal basin there are at present 26 mines of different capacity in operation; of this number seven are open-cast mines. By nationalization this mining property, originally divided among 14 individual mining companies or owners, was amalgamated into one corporation, namely "The Falknov Brown Coal Mines, National Corporation", with the head office at Falknov.

On the Bohemian and Moravian territory there occur also lignite deposits. This is a kind of inferior brown coal of wooden structure with a low calorific value and a high moisture and ash content.

The extremity of the Zittau lignite basin is in Northern Bohemia, where the lignite is mined in one single open pit at Hrádek nad Nisou. The calorific value of this lignite varies from 2,000 to 2,800 calories and the moisture content is about 40 per cent.

In Southern Bohemia lignite is deposited in basins of Budějovice and Třeboň. The most important lignite deposit is near Mýdlovary, where the Svatopluk open-cast mine is in operation. Lignite of about 1,500 calories is used in a thermal power plant. Lignite resources are estimated at about 20 million metric tons. The second important occurrence is near the village Čičenice, where the open-cast mine "Jaroslav" was opened during the last war. The lignite from this mine is difficult to sell as it is of inferior quality and needs first to be treated. The estimated reserve of this lignite bed is about 28 million metric tons.

A larger resource of lignite occurs in Southern Moravia in the district of Hodonín - Kyjov - Bzenec. The workable seam is from 2.5 to 4 metres thick and deposited at a depth varying from 2 to 250 metres. The calorific value of this lignite is 2,200 to 2,900 calories and the moisture content up to 40 per cent. The estimated reserve of lignite to the depth of 120 metres amounts to about 100 million metric tons.

Lignite is here mined in 12 deep mines with capacity from 50 to 300 metric tons per day.

Owing to its inferior properties this lignite is suitable only for the local market. In order to utilize the smaller sizes a plan has been made to set up a thermal power plant.

By nationalization all these lignite mines have been centralized under one administrative unit and become integral parts of "The Rosice and South Moravian Coal Mines, National Corporation", with its managing office at Zastávka near Brno.

In Slovakia there are several deposits of brown coal known of which only a few are important with regard to the possibility of exploitation on a larger scale.

The best developed brown coal deposits are those in the neighbourhood of Handlová; for the purpose of their exploitation a mine at Handlová and recently one in Nováky have been set up.

In the Handlová coal basin two seams occur; the upper seam, also called the "main" seam, 3 to 9 metres thick, and the lower seam about 30 metres deeper, which is 1.5 to 2 metres thick. The lower seam is not developed throughout and at some places is unworkable. By their origin the seams belong to the Upper Mediterranean stage of Miocene epoch. The seams dip under 10 to 15° and are considerably dislocated by faults. The thickness of overburden increases from north to south from 0 to 400 metres.

The calorific value of the coal varies, according to its depth, from 4,500 to 6,000 calories. The mine at Handlová is equipped with the modern, "Chance-Sand" preparation plant for washing the sizes of coal from 13 to 200 mm. The unwashed coal of size 0 to 13 mm. is burned in the mine power plant.

To the west of Handlová a new mine was opened at Nováky during the war. In this district only one seam is deposited, this is 7 to 10 metres thick and of the same geological age as the seams in the Handlová district. However, the calorific value of the coal from this seam is much lower - about 2,700 calories and its structure is lignitic. The present output capacity of the mine at Nováky (1,200 metric tons per day) will be raised up to 4,500 metric tons. The

resource is estimated to about 70 million metric tons. The mined lignite will be used for generating power in a new plant.

In Slovakia the coal mines are organized by one administrative unit "The Coal Mines, National Corporation" with the central office at Prievidza.

The following table shows the output of brown coal in each individual brown coal mining district and the total brown coal output in Czechoslovakia since the year 1913, excluding the war years.

Year	Brown coal output in million metric tons					
	Most brown coal basin	Falknov brown coal basin	Lignite in South Moravia	Lignite in Bohemia	Slovakia	Czechoslovakia Total
1913	18,607	4,097	0,254	0,058	0,120	23,136
1919	13,113	3,781	0,240	0,043	0,147	17,324
1929	17,410	4,260	0,225	0,089	0,559	22,543
1930	14,783	3,526	0,200	0,086	0,565	19,160
1931	13,887	3,153	0,220	0,068	0,541	17,869
1932	12,052	2,968	0,200	0,075	0,492	15,787
1933	11,488	2,749	0,184	0,082	0,465	14,968
1934	11,362	2,855	0,216	0,101	0,536	15,070
1935	11,450	2,739	0,277	0,093	0,554	15,113
1936	12,045	2,853	0,342	0,110	0,598	15,948
1937	13,346	3,312	0,383	0,121	0,733	17,895
1946	13,418	4,713	0,445	0,322	0,577	19,475

The Two-Years Economic Plan assumes the brown coal output to be 21,822,000 metric tons in the year 1947 and 23,900,000 metric tons in the year 1948. This increased brown coal output target has been set because it is foreseen that the present consumption of bituminous coal will to a great extent be exceeded by that of brown coal.

The following table illustrates how the total planned brown coal output is proportionally divided among individual mining districts:

Brown coal mining district	The planned brown coal output in metric tons	
	in the year 1947	in the year 1948
Most district - - - - -	15 900 000	17 145 000
Falknov district - - - -	4 275 000	4 950 000
Lignite in Bohemia - - -	308 000	344 000
Lignite in Moravia - - -	480 000	537 000
Slovakia districts - - - -	769 000	924 000
Total - - - - -	21 822 000	23 900 000

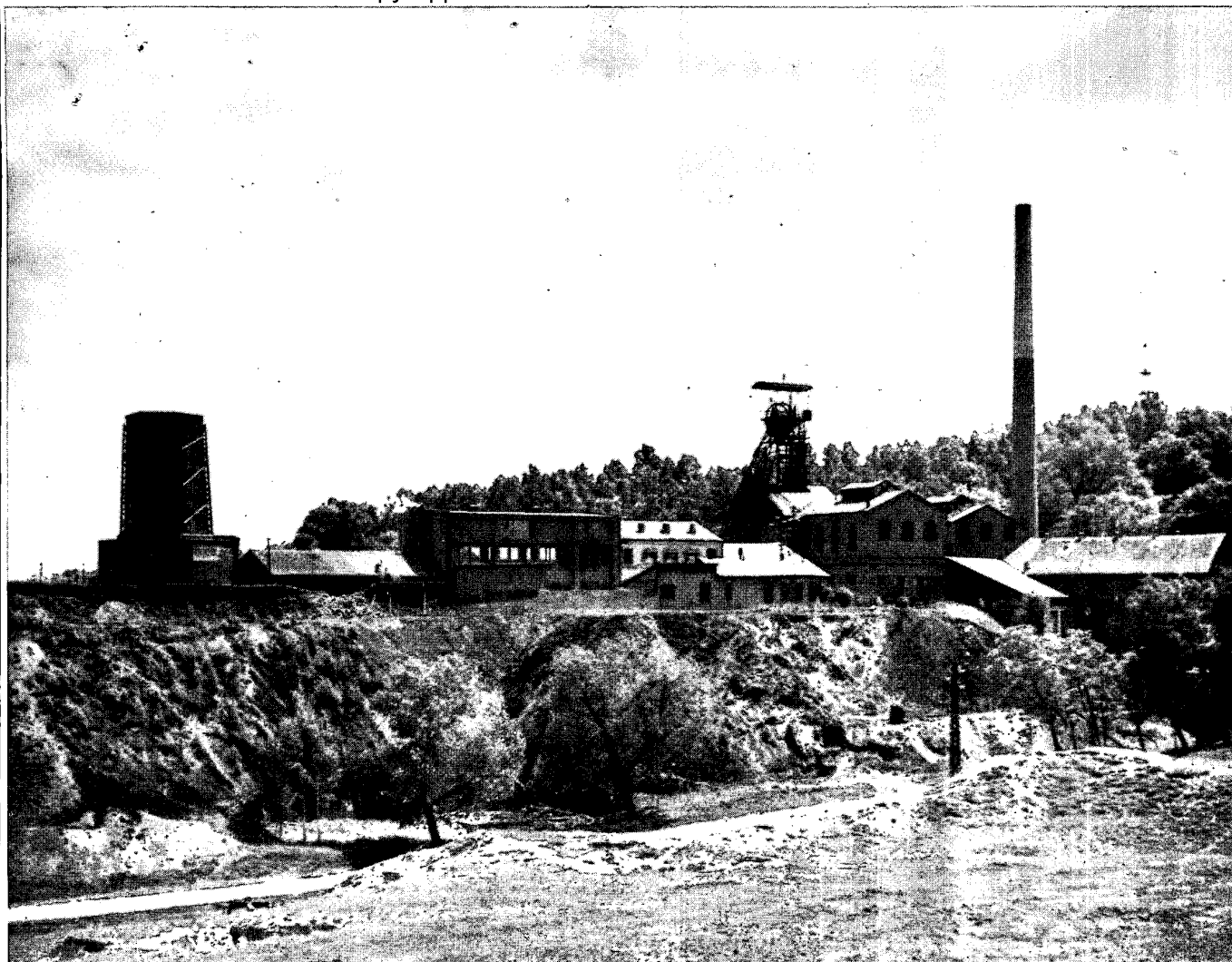
The results, already achieved in brown coal output, justify the hopes that the target will be reached.

ING. EDUARD PSTRUŽINA.

Working the brown coal by the "Chambers" method.







*The deepest mine in Europe.*

## **Ore Mining in Czechoslovakia.**

**6.**

Already in the last century the world development of mineral wealth exploitation resulted in shifting the weight of mining activity from ores to coal in Bohemia, and to a greater extent in Moravia and Silesia. In Slovakia, however, the importance of ore mining still surpasses that of coal.

All mines in Czech countries, exploiting nonferrous ores, have been concentrated in one administrative unit - "The Ore Mines of Příbram, National Corporation" at Příbram - with the original mining works at Březové Hory and Bohutín, and with the lead-silver smelting and refinery plants as well as wire-rope and lead-ware manufactures. The ore veins of Příbram ore-bearing district occur in diabase dikes penetrating through sedimentary Algonkian and Cambrian rocks. The silver-bearing galena predominates amongst other numerous ores which occur here. Of these the rich

silver-bearing ores, zinc, antimony, and copper ores, and the relatively rare cobalt ores are to be mentioned. The mines of Příbram, once very rich and prosperous, and famous in mining history, suffered very much in the last century by the fall of the silver standard and their prosperity rapidly decreased. Bad working conditions, which are made worse when the depth of mines is increased (the "Anna" mine at Březové Hory is the deepest mine in Europe), are considerable draw-back to the desired restoration. The necessary level of prosperity will be achieved by the proposed mechanization of mining operation and by beneficiation of the final products.

The tungsten-tin ore mines at Horní Slavkov, Rotava and Cinvald, in the Ore-Mountains region, were attached to the Příbram Ore Mines by the nationalization of the mining industry. These mines with their dressing plants are at

present in full operation. Their production covers a considerable part of the home demand.

The flocculous graphite mines at Chvaletice and the flotation dressing plant at Netolice, are similarly amalgamated with the Příbram Ore Mines. The most modern graphite flotation plant in Europe is to be found at Netolice. Also the amorphe graphite mines and washing plants at Kolštejn and Malé Vrbno near Staré Město na Moravě belong to the Příbram Ore Mines. Both these kinds of graphite are not only sufficient for our home consumption, but owing to their superior quality, have found a fairly good sale abroad.

At a considerable expense the National Corporation of the Příbram Ore Mines carries with it, in its administrative and managing function of a Division Board, a research and prospecting work, exploring for gold, lead-silver, copper, antimony, molybdenum, and nickel-ores in various districts of Bohemia and Moravia. The most important item to be mentioned from this activity is the experimental mining carried out at Kutná Hora and Jílové near Prague. These ancient towns are famous in the history of our gold and silver mining.

At Jáchymov, there has been formed the second ore mining enterprise organised in one administrative unit - "The Jáchymov Ore Mines, National Corporation". The "mid-night" veins, penetrating here through mica-schists, had once been the richest occurrences of ores in Bohemia. They were superior to the very rich lodes of the Příbram ore-bearing district by their high number of useful minerals (over 80). The former important production of silver and cobalt-nickel-bismuth ores gave way later to the mining of uranium ores containing radium.

The mining of iron ores in Bohemia is controlled by "The Central Bohemian Coal and Iron Ore Mines, National Corporation", at Kladno, which exploit the chamiosite deposits in the Silurian System near Nučice, Chrastenice and Zdice, and red iron ore beds at Krušná Hora and Mníšek. Magnetic iron ore is mined at Vlastějovice. The open mine at Chvaletice in the Iron Mountains district, where the iron-manganese ore deposit is exploited, also comes under the administration of the managing unit at Kladno.

In Moravia the exploration and mining of iron ores is under the administration and management of "The Ostrava-Karvinná Bituminous Coal Mines, National Corporation", at Ostrava. The most important beds of magnetic iron ore and of red iron ore are bound on the Devonian diabase zones, folded out of Lower Carboniferous strata in the neighbourhood of Uničov and Šternberk in North Moravia. The old mines near Medlov and Rídeč which have once been abandoned were reopened during the last war and are at present in operation.

Ore mining in Slovakia is chiefly concentrated in two important ore-bearing districts; namely the volcanic Tertiary region of Slovakian Hills near Kremnica and Štiavnica and the Spiš-Gemer Ore Mountains, called Slovakian Ore-Mountains.

The ore veins and impregnations in the first mentioned region ("young veins group"), which originated to the end of Neogene, contain chiefly precious metals (gold and silver) and in a smaller degree also lead, copper and zinc ores. The mines existing in this district are amalgamated in one administrative unit "The Ore Mines and Metallurgical Works, National Corporation" at Báňská Bystrica, to which also belong the antimony-ore mines in Slovakian Ore-Mountains, Low Tatra and Little Carpathian Mountains. The last named ores have a considerable amount of gold, which is successfully recovered when smelting antimony. By the considerable high number of mined antimony

deposits in Slovakia, the Czechoslovak Republic is at present the largest producer of antimony in Europe and stands third in the antimony world production. From mines belonging to the above named administrative unit we have yet to mention the antimony mines at Pezinec, Poproč, Čučma, Dúbrava and Vajsková, and the gold, silver, lead and zinc ore mines at Báňská Štiavnica, Hodruša and Kremnica.

The second important ore-bearing district in the Slovakian Ore-Mountains contains many lodeous and lenticular deposits of iron ores, mainly of siderite which, near the surface had been transformed into limonite. The veins and the metasomatic deposits appear in the Older Mesozoic porphyritic rocks and crystalline schists, and contain also copper ores, to a small extent also silver, cobalt and nickel ores, and at Kotrbachy even a considerable amount of mercury ore (Schwazit). In the "flysch" zone, between High and Low Tatra Mountains near Švábovice and Kišovec, close to the Košice-Bohumín railway line, there occur extensive deposits of poor manganese ore. The iron ore mines near Rožnava, Lucibania, Vlachovo, Niežňina Slaná, Dobšiná, Mlýnky, Železník, Kotrbachy, Markušovce and Maria Huta are important. Pyrites are mined at Smolník. The mines at the places quoted are combined under one administrative unit "The Iron Ore Mines, National Corporation" at Spišská Nová Ves.

The amount of iron ore and lead-silver ore production is shown in the tables below, stating the results achieved in the past years as well as the production assumed by the Two-Years Economic Plan for the years 1947 and 1948.

Iron ore production, in metric tons:

Year	Bohemia and Moravia	Slovakia	Total
1919	496 284	451 057	947 241
1929	808 942	998 721	1 807 663
1930	673 878	979 042	1 652 920
1931	517 171	177 907	1 235 078
1932	233 264	368 951	602 215
1933	232 493	196 279	428 772
1934	288 583	250 159	538 742
1935	373 246	357 812	731 058
1936	548 157	541 466	1 089 623
1937	745 211	1 091 284	1 836 495
1946	367 262	748 812	1 116 074
1947 (plan)	449 900	1 048 700	1 498 600
1949 (plan)	521 100	1 216 100	1 737 200

Lead-silver ore production, in metric tons:

Year	Total	Year	Total
1913	71 356	1934	139 144
1919	46 443	1935	151 424
1929	116 645	1936	161 707
1930	155 564	1937	168 967
1931	153 793	1946	117 312
1932	147 156	1947 (plan)	172 100
1933	133 790	1948 (plan)	205 650

ING. VLAD. KOVÁŘ.

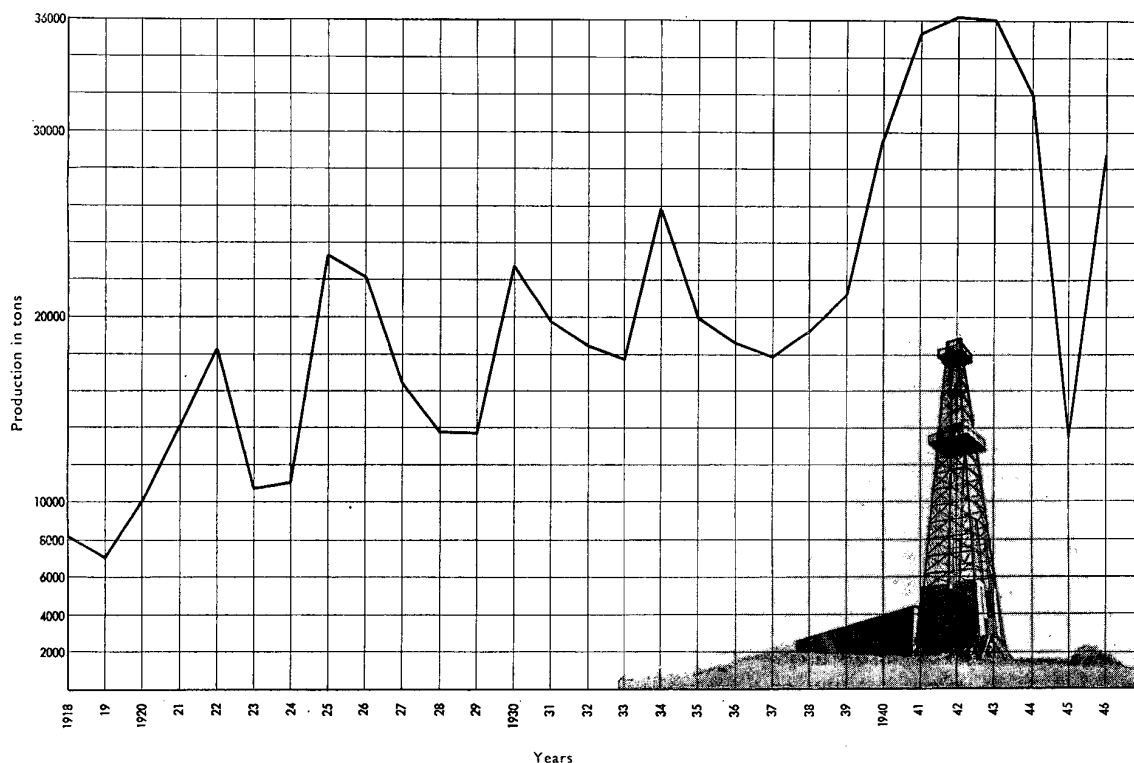


Diagram showing the petroleum production in Czechoslovakia in 1918—1946.

## Czechoslovak Petroleum and its Future.

7.

The surface occurrences of petroleum and natural gas on the territory of the Czechoslovak Republic have been known for a long time. They appear in the Tertiary, intensively folded "flysch" regions, near the Polish frontier of East Slovakia and in the Moravia-Slovakia borderland. The local inhabitants used to catch the petroleum, which issued from the surface, and used it mainly for curing skin diseases. The first records about exploring for oil date from the middle of the last century, which marks the time when petroleum was first begun to be won on an industrial scale. At that time two shafts, 10 and 15 meters deep, were dug out and a horizontal adit was driven at Miková, in Slovakia, near the Polish frontier. Later on, similar experimental works were carried out at other places but without any results or with only a negligible yield of petroleum, which was used in the neighbourhood for similar domestic purposes as that mentioned above.

The development of the production of petroleum, which had been found on the northern slopes of the Carpathian Mountains in Poland, initiated a more extensive drilling activity in the "flysch" regions of the Czechoslovak territory. Since the eighties of the last century numerous bore-holes have been made to a depth of 1,000 metres in the "flysch" strata of the older Tertiary formation of the Carpathian Mountains, partly in East Slovakia near Miková, Vyšší Komárník, Radvaň, Krivá Olka, partly in the Moravia-Slovakia borderland near Turzovka, Staškov, Bohuslavice nad Vlárou, Napajedla, etc.

Besides, the "flysch" strata covered by younger Neogene beds had been drilled, chiefly near Gbely, Hodonín and Ratiškovice. In most of these drill-holes more or less intensive emanations of oil and also eruptions of natural gas were found. However, economically workable petroleum deposits have not yet been discovered in the "flysch"

region of the Czechoslovak territory. The best results were achieved in the drill-holes in the "flysch" strata in the vicinity of Turzovka, where in 1929 150 tons of high-grade benzene oil was won from two wells. However, this yield did not nearly cover the expense of constructing and carrying out running these two wells.

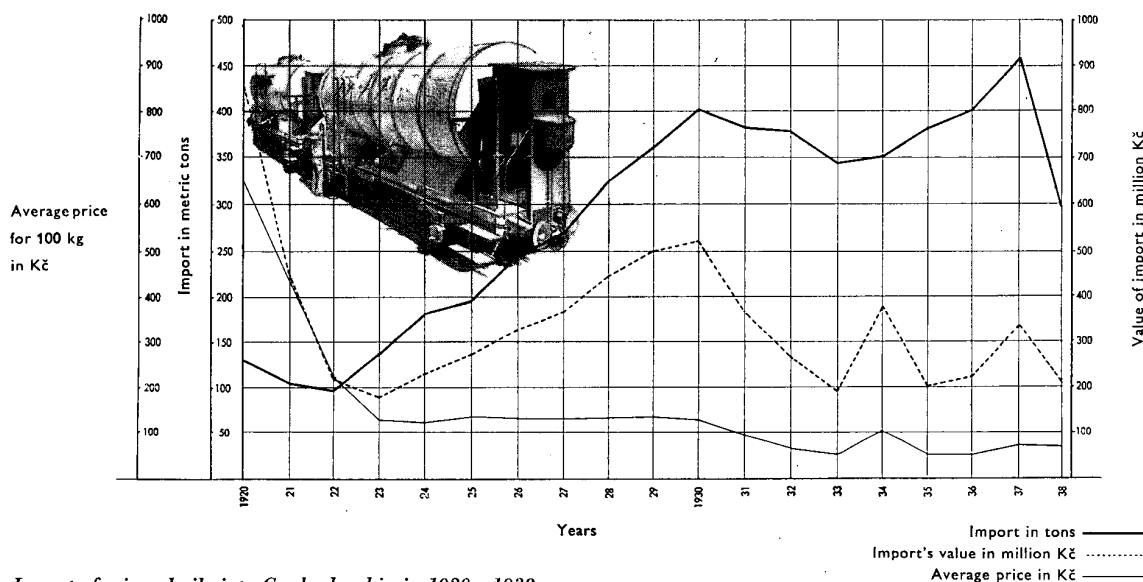
The first economically workable petroleum deposit was discovered in the year 1914 at Gbely, in the Moravia-Slovakia borderland at a depth of 150 metres in the Sarmatian strata of younger Tertiary. To start with, 15 tons of oil of naphtene base per day was won; a first-rate raw material for the production of motor fuel, transformer oils and lubricating oils.

In 1923 further economically possible oil deposits were discovered by drilling in strata of the same geological age near Hodonin.

The position of Czechoslovak oil fields is shown in the map. With the exception of a few drill-holes carried out without a systematic geological and geophysical research work and without first investigating the detail structure of the oil-bearing strata, no systematic exploring for new petroleum deposits had been carried out.

The development of petroleum production in the South-Moravian Neogene region took place during the last war when the Germans realized that they would not dominate the rich oil fields of Iraq, Iran and the Caucasus after their defeat at El Alamein and Stalingrad. For these developments they used foreign capital invested in Czechoslovakia.

In this work very promising oil-bearing structures were discovered at several places. Up to the end of the war less amount of oil and natural gas had been won. There is



*Import of mineral oils into Czechoslovakia in 1920-1938.*

Up to 1939 petroleum production in Czechoslovakia did not undergo any considerable change or fluctuation. But during the war production increased to a striking degree. The annual production of petroleum from 1918 to 1946 can be seen in the diagram.

Natural gas is to be won as well as petroleum. Before the war the gas had been mostly consumed by the petroleum mines for their own operation purposes and a small amount was delivered to the Czechoslovak Railways. During the war the natural gas was used for trucks; owing to the shortage of liquid motor fuel this gas is still used.

From the diagram illustrating the import of petroleum it can be seen that petroleum production does not come up to the import of mineral oils into Czechoslovakia. Before the war mineral oils were imported mainly from Rumania. Since the war the chief suppliers are Austria and Hungary. In supplying Czechoslovakia with motor fuel the Stalin Works at Most, which produce motor fuel by hydrogenation of brown coal, play an important role.

On Czechoslovak territory about 1,000 bore-holes have been drilled to an average depth of 150-400 metres; of these about 900 holes were drilled in the region of Gbely-Hodonin and in the adjoining districts.

justification for hoping that the oil production of Czechoslovakia will be considerably increased after overcoming various difficulties caused in the Moravian oil fields by damage to drilling equipment during the war operations between the Red Army and the Germans in the spring of 1945.

Before the war several private companies were occupied with oil prospecting; the State also carried out some exploring works in so far as the allotment from the State Budget permitted. The private prospectors, however, were not, for the most part, financially or technically fitted enough for a systematic, responsible and very complicated investigation and production activity in oil. The prospecting firms, mainly for speculative reasons, kept the achieved results of their investigations from publication, or else they presented distorted records. There was no uniform administration and management which could organize a systematic research and production of oil according to scientific, technical and economical principles, which have to be applied in prospecting and winning oil. Last, but not least, there was not enough necessary interest and understanding on the part of the Government and competent political economists and no taxation preferences

had been granted to the enterprises carrying out the exploring for new oil fields.

In next future the most important, petroleum producing district in Czechoslovakia will be the region of the Neogene extremity of the Pannonian Basin of younger Tertiary in South Moravia and West Slovakia, between Bratislava, the capital of Slovakia, and the oil fields of Gbely.

At a later date it is planned to investigate the Neogene region, spreading approximately between Bratislava, Komárno, Nitra and Trnava. In this region, geophysical and geological research have been carried on in only a very small way.

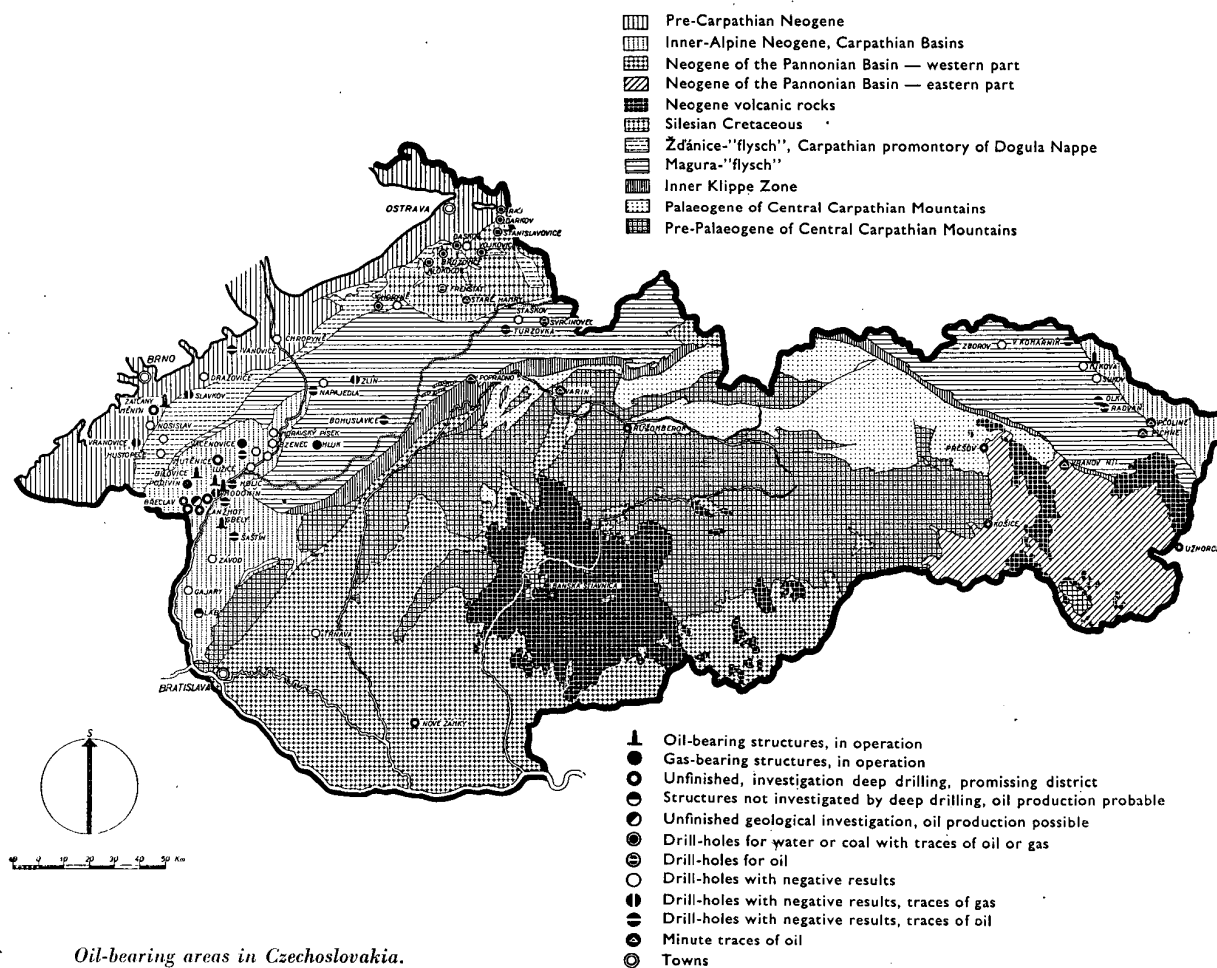
It will also be necessary to investigate the Neogene strata between Sokolnice and Přerov in Central Moravia as well as those in East Slovakia, and the "flysch" Carpathian region. By the nationalization of Czechoslovak industry the research and the petroleum production have been laid on a sounder basis. The former small enterprises, working independently, were by nationalization amalgamated into one single, technical and administrative organized unit

"The Czechoslovak Petroleum Works, National Corporation", with a registered office at Hodonin.

This corporation together with the General Management of Czechoslovak Mines in Prague (Central Mining Board) and in collaboration with the experts of scientific institutions as well as of central boards, operates in the investigation and production of petroleum on the whole territory of the Czechoslovak Republic according to a uniform plan prepared beforehand on the modern principles of research work.

The Czechoslovak Government, being aware of the economic importance of mineral oils shows full understanding for the realization of the set tasks. Under such conditions, all who work in this branch, are surely convinced, that inspite of certain temporary failures, which are impossible to avoid even with the greatest care when exploring for new oil deposits, they will succeed by hard and co-operative work in overcoming all difficulties and in achieving in a few years our aim — the self-sufficiency in mineral oils economy.

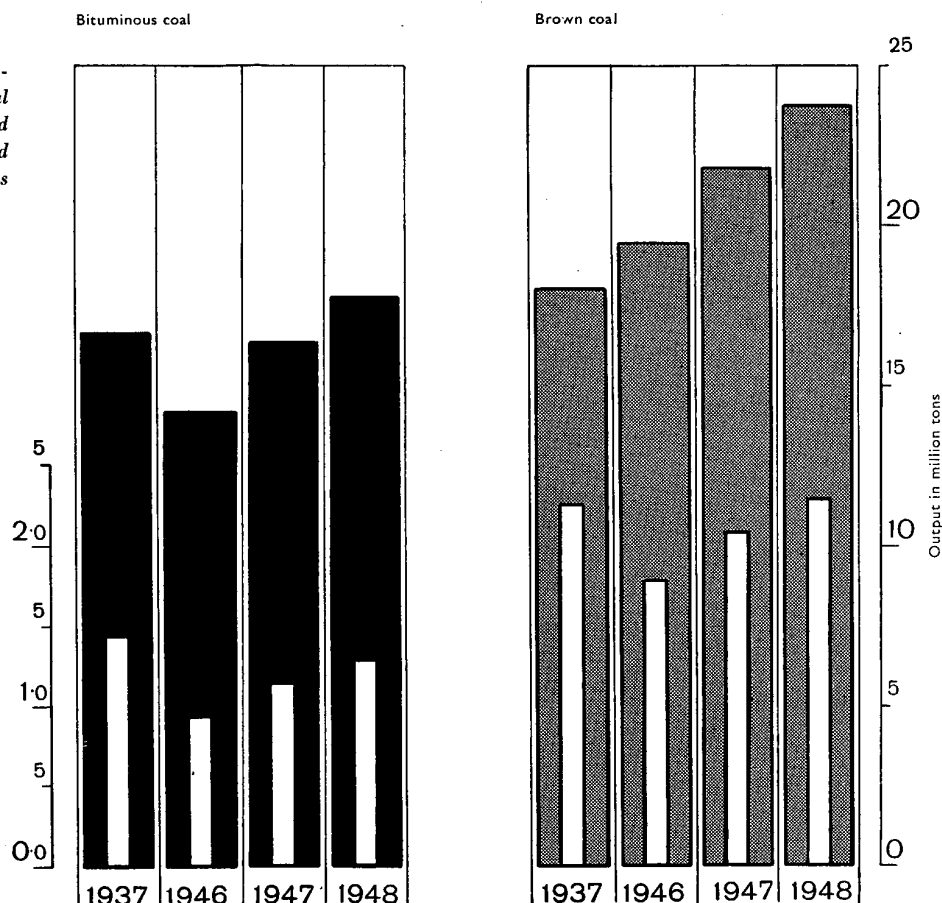
ING. MARTIN FRAJ.



*The output of bituminous and brown coal in the years 1937 and 1946 and the planned output for the years 1947 and 1948.*

Output per manshift in tons

*In the diagrams of output the overall output per manshift for specified years are shown in white columns.*



## The Two-Years Plan in Mining.

8.

The Czechoslovak Republic has by the Two-Years Plan, placed itself among those countries which already control, or are going to control, their economy according to a definite and systematic plan. With us, this purpose was expressed by the Two-Years Economic Plan Act.

According to the Two-Years Plan Act, the production of the mining industry is given first place as a basis of the whole economic life of our country. The task of the Two-Years Plan is to renovate and reconstruct the nation's economy which is still greatly upset and disorganized owing to the war and occupation, and also to restore the public standard of living to the pre-war level. The production of the whole industry must exceed the average pre-war production by 10 per cent, although, by the evacuation of the Germans and the Hungarians, the number of employees in the industry has decreased considerably. The necessary factor to achieve this aim is that there will be

enough coal production of other branches of industry, as planned, will then be made possible.

The planning was necessary, especially in the mining industry, when this fundamental industry ought to be restored, at least to a pre-war state, as soon as possible and with a minimum of waste. At the end of the war the condition of our mines was such as to cause much anxiety about the future of our mining industry. Firstly, our coal mines were considerably exhausted by the war economy and secondly, during the occupation, the working of mines was careless and unmethodical and without any thought for the future. For instance, the coal output was raised to a possibly high rate by mining the coal from seams which ought to have been preserved for a later time, and the opening and development work was entirely neglected. The absolute exhaustion of coal mines began to be obvious even before the end of the war, when the output decreased,

inspite of additional forced labour and severe compulsory measures.

The machinery equipment of our mines suffered great damage as there were not sufficient supplies of spare parts; the machines were usually run overloaded and their control and maintenance were not thorough, partly due to unskilled forced labour and partly to the intentional sabotage done by the Czech employees. The quality of the machinery equipment, at this time, was mostly very bad.

The human factor, which is the most important and decisive component of every production, was more adversely influenced by the occupation than anything else. The enforced high output and undernourishment caused a general weakening of the miners' health. The compulsory labour system brought into the mines employees who did the forced work with concealed dislike and revolt and used the liberation as a welcomed opportunity to leave the mines as soon as possible. All these conditions resulted in a moral disorder of our miners and caused a considerable lowering of efficiency and coal output and also a great fluctuation of manpower.

Moreover, the difficult situation of our mining industry was made worse by the disorganization in some of our coal-mining districts where, after the Germans left, all the vacancies of leading positions had to be filled with new persons. Also the whole organization of great mining concerns had to be changed. Selfsacrifice and hard work of most of the employees - despite the general disorganization - made it possible for the mines to be kept going and an output secured which was sufficient to save the whole of our industry from becoming paralyzed. However, it was necessary to work out a uniform plan in order to get our mining industry into a normal and efficient state and at least to restore it to a prewar level. Nationalization has given us the necessary condition for planning, for a rapid recovery of our industry, enabling a uniform organization and a planned reconstruction and stabilization of our mining industry.

The Act No. 192, of the 25th October 1946, provided for the mining industry the following targets: in the year 1948 the mining production will have to be increased so as to make an output of:

bituminous coal	-----	17,746.000	metric tons
brown coal	-----	23,900.000	ditto
coke	-----	3,910.000	ditto
iron ore	-----	1,737.200	ditto
oil	-----	82.000	ditto.

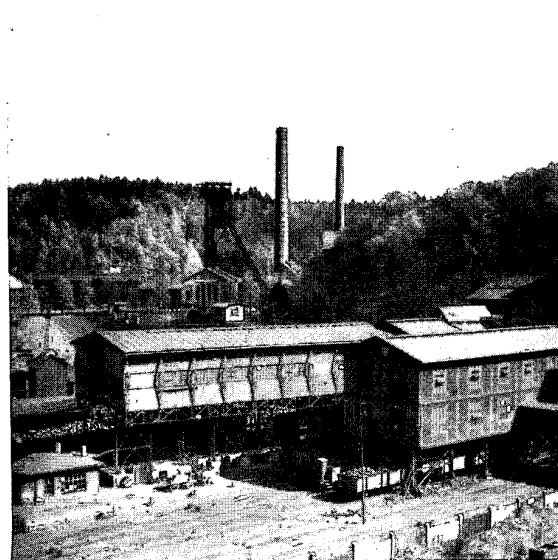
In the year 1947, there should be an output of 16,374.000 metric tons of bituminous coal, 21,822.000 metric tons of brown coal, and the production of coke should be 3,740.000 metric tons.

These are considerably high targets. The output of bituminous coal in the year 1948 is supposed to reach the same level as it did in 1937; for brown coal the Two-Years Plan Act provided an output which ought to be about one third higher than it was in the year 1937. Such a high output of brown coal will be necessary to meet the increased demand due to the new methods of brown coal utilization as a raw material for chemical production. The other reason for a higher output of brown coal is the expected partial change in consumption from bituminous coal to brown coal. The output of iron ore will have to reach nearly the same level as in the year 1937. More than two thirds of this output will be produced in Slovakia, which is much more than it used to be before the war. The reason is that the Czech iron ore deposits are reaching a state of exhaustion and also the quality of Czech iron ores is continually decreasing. For oil production the Two-Years Plan Act proposes a target which is four and a half times higher than the production in 1937.

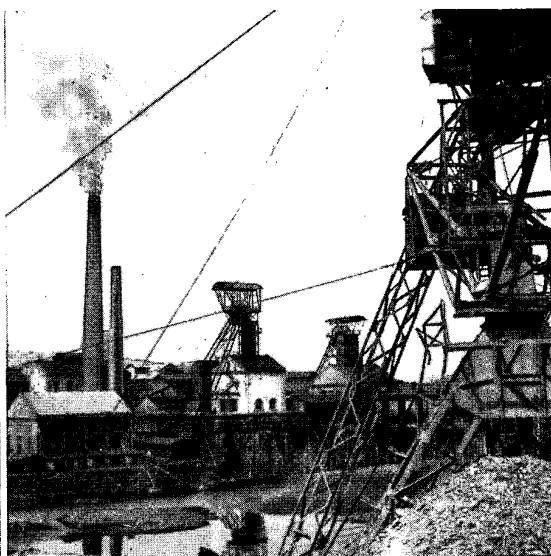
To realize the planned and set tasks the necessary conditions have had to be taken into consideration. These are the number of employees, the need for operational material and necessary investments. The Two-Years Plan also pays much attention to the building of dwelling houses for miners, these are very urgent if permanent workers are to be obtained. According to the Two-Years Plan there are 9,600 dwelling units for miners to be provided in the years 1947, 1948.

The targets given to the mining industry have been worked out in detail operation plans for each individual plant and working place. The miners have been acquainted with the targets and they are continually informed about the results achieved. Our miners take the Two-Years Plan for their

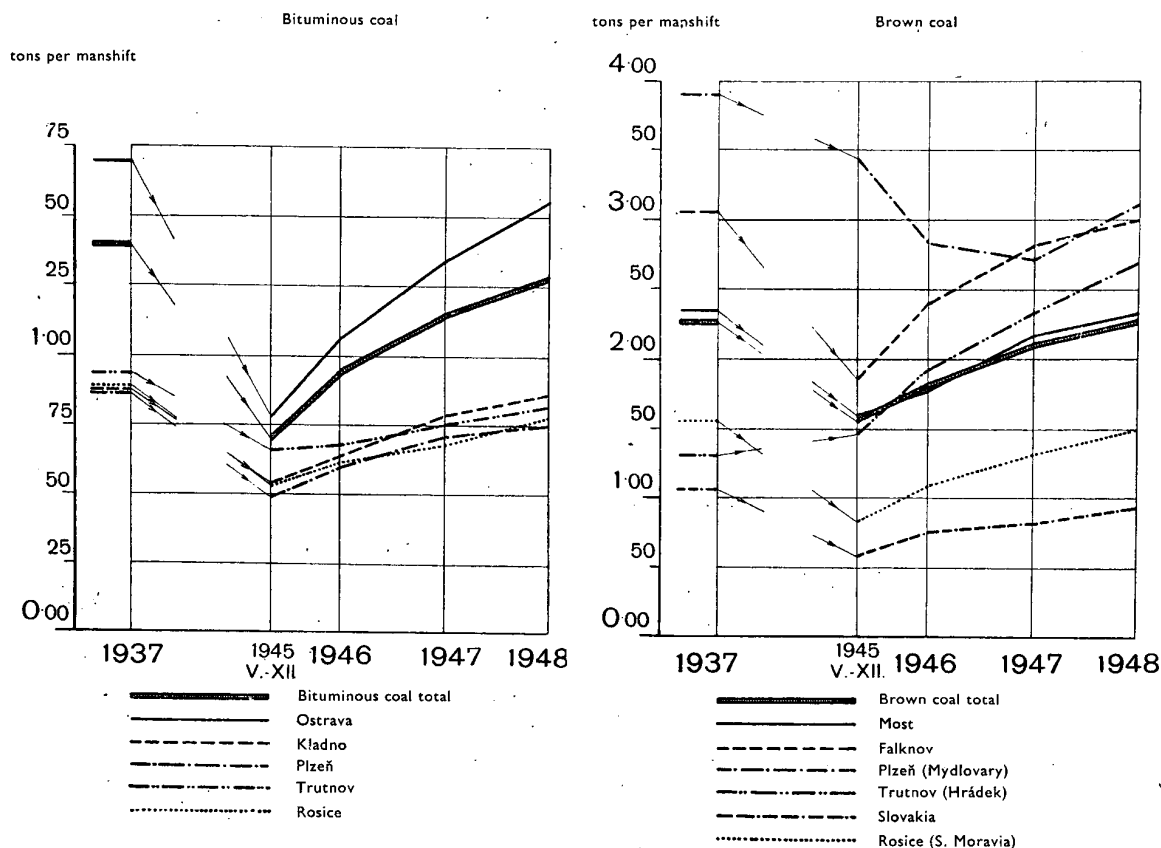
*One of the numerous Czechoslovak coal mines.*



*Bituminous coal mine in East Bohemia.*







Output per manshift in bituminous and brown coal mining in the years 1937 and 1946 and the planned output per manshift for the years 1947 and 1948.



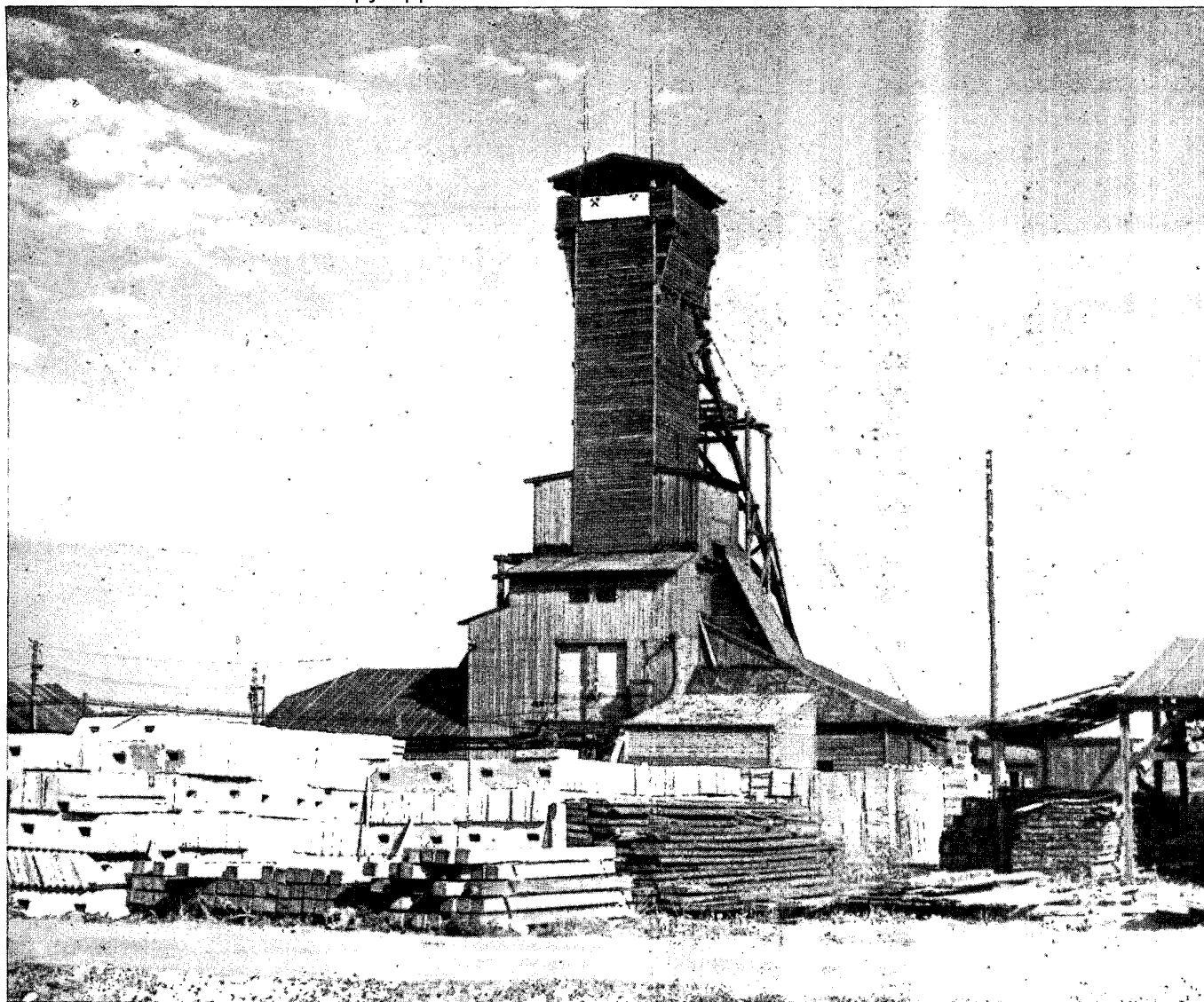
own and in a manly competition they try, not only to reach the planned level of production, but to get above it and so to achieve the aim which our Government made its own task.

In January this year the mining industry fulfilled the plan to 105.1 p. c., in February to 101.5 p. c.; these results have been achieved under extremely difficult conditions caused especially by a longlasting winter and hard frosts. From these results it is obvious that the plan for the mining industry had been made on the basis of objective suppositions and that it is possible to expect that the Two-Years Plan will be, in the mining industry, not only reached but even surpassed, especially in coal-production, as it is necessary for our economy.

The Two-Years Plan in the mining industry is – as a matter of fact – a quantitative plan. At first, it has been planned, to obtain only the quantity of coal which is absolutely necessary for our economy. In the beginning the economical conditions compelled us not to lay stress on the cost of mining production. But later on, the mining industry will have to pass over to qualitative planning which is the inevitable complement of the quantitative planning, because the grade of our nation's wealth depends not only upon the quantity of products but also upon the amount, which we have to spend on their production.

The purposes of qualitative planning is to determine the methods and norms eliminating wastes and uneconomical production.

ING. FRANTIŠEK SIMÍN.



*One of several new mines under construction in Czechoslovakia.*

## **Research Work in Czechoslovak Mining.**

**9.**

Research work in mining is partly faced with the same problems as other branches of industry. There are many difficult problems of production in the mining industry; problems, beginning with providing the necessary manpower and mechanical handling equipment and ending with the questions of physical properties and treatment of the products. The actual object of mining enterprise and production is the winning of useful minerals which mostly serve as the rawmaterial for other industries. Also in mining the production is a process predominantly aimed at the sale of products in which the costumer is interested. The relation of the general majority of the numerous branches of industry to the supplier is formed by demanding definite properties of procured semiproducts or parts. But in mining this relation requires quite a different solution as the supplier to the mining industry is the natural wealth

of the Earth's crust itself, and there is no possibility for the miner to choose or dictate the quality of material he obtains from natural mineral resources. Because of this the mining research work fundamentally differs from that one carried on by other branches of industry.

The chief aims of the research activity of the Czechoslovak mining are traced by the Central Board as well as by the individual mining plants in a direct connection with their routine operation.

The comprehensive tasks of mining research are solved by a close co-operation with public, scientific, technical, economical, and social research institutions. A collaboration is being established with Universities and with research stations of other branches of industry at home as well as abroad.

As well as this, the Czechoslovak Mines own a special Insti-

tute for the scientific research of coal, now enlarged for research of all kinds of fuel, ores and minerals. Here, first of all, the necessary production and beneficiation processes for all fundamental raw material and final product are examined and tested by scientific methods. This Institute is at present one of the best institutes of this kind in Europe because of its equipment and high scientific and technical level.

No less well-developed is the actual organization which aims at the safety of employees in mining. This branch of research work in Czechoslovak mining has a good tradition; it is in continuous collaboration with research centres at home as well as with competent research institutions abroad. Miners of all countries are united by a brotherly and mutual understanding because of the increased dangers and risks which are found in their work. These dangers are caused by the physical conditions of the mineral deposits, rock pressures and bursts, exhalations of gases and frequent handling with explosives. Good results in successful research work in this respect are met with response by all those who are concerned. The Czechoslovak mining, which has such rich experiences of natural conditions and occurrences in own mining districts, has organized several research stations equipped with the most modern technical appliances, so that our mining experts are well provided in all respects for co-operative work and are able to make the best use of their study of special experiences of foreign investigators. The Central Board of Czechoslovak Mines is interested in the preparations and arrangements being made for the planned foundation of the Mining Research Institute at Lidice, which ought to be a centre of international importance as regards the research of safety in mines. From the results of other research activities, concerning the problems of obtaining the objects of production, follows the origin of mining and also of the greater part of other industries. Often the actual operations of production are bound to the research work carried out along side. As a typical example of this close relationship is the exploring for and the production of petroleum, where the research

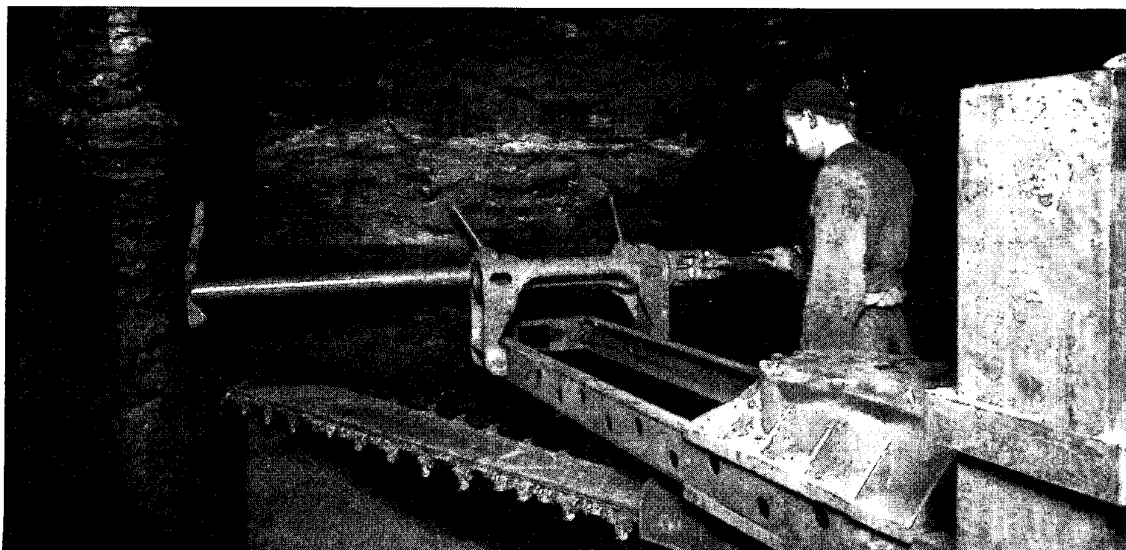
work forms an integral part of the production operations. This kind of research work consist of an extensive activity in systematical evidence and investigation of mineral occurrences, in the examination and determination of physical and chemical mineral properties, and working out the plans of experimental mining, which in the case of successful results extends to a fully developed mining operation. There is no doubt, that a close co-operation with competent research institutions is also essential here. Within the scope of the organisation of Czechoslovak Mines the geological exploration carried out by means of measuring physical phenomena is purposely playing an important role. The use of geophysics has recently become a means which is applied in many directions in mining research.

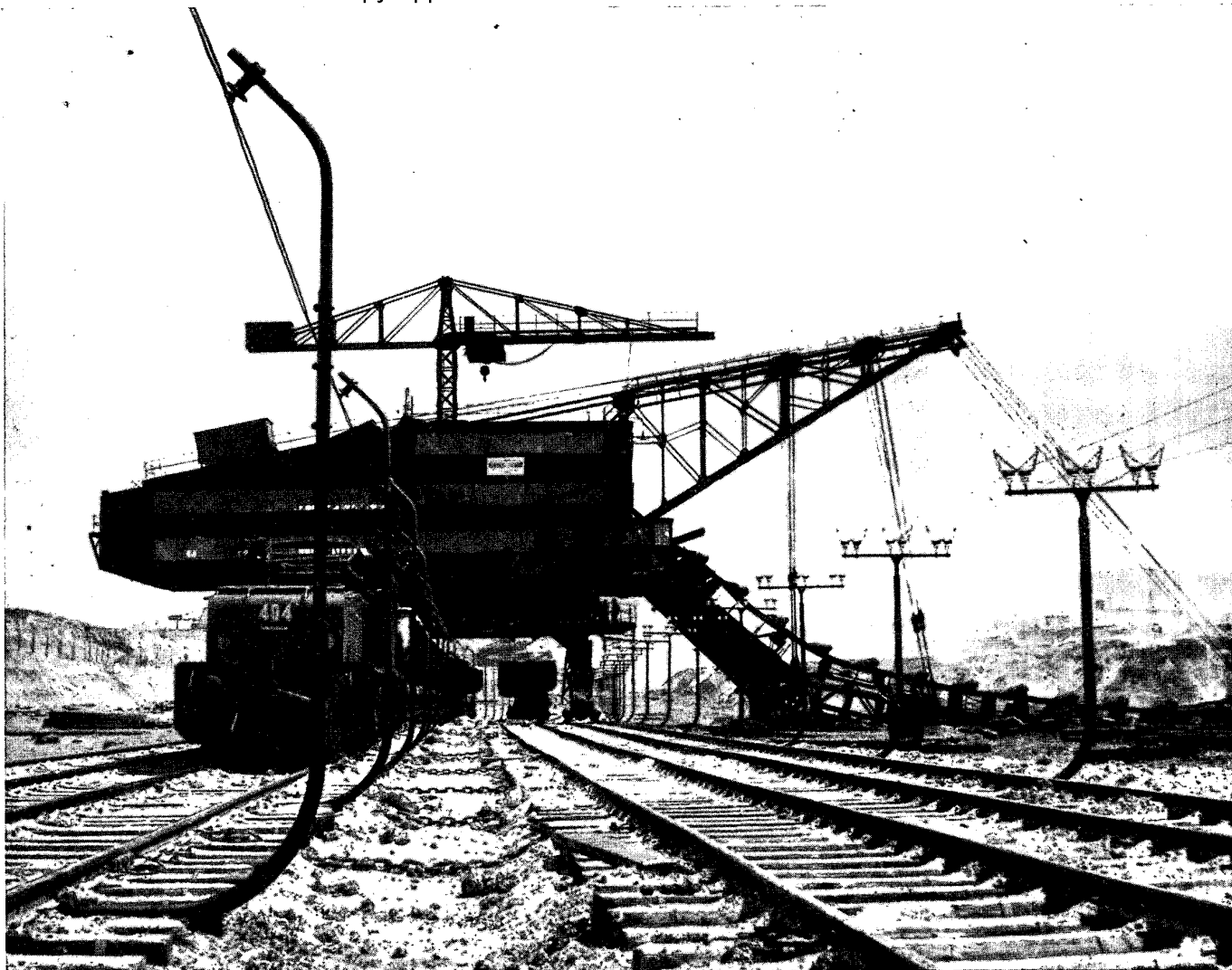
Perhaps, in no other branch of industry are there so many cases of direct interest and influence on the part of nonexperts as there are in mining. The motives here are different; sometimes it is a local interest assuming possibilities for improved conditions in a town, or district, sometimes interests of individuals who are occupied with nature study in a dilettante way, and sometimes even the egoistic aspirations to win fame or the longing for imaginary riches. The task of mining research is also to guide and to set limits to suggestions, which might lead to unfounded hopes and cause unnecessary disturbances to the inhabitants of the town or district concerned.

The necessity for preserving the results achieved in mining operations also lies within the scope of Czechoslovak mining research work. Old mine-openings have often been obliterated by new workings, and mining activity has gone through frequent changes and turning points, and sometimes, here and there, has ceased altogether. However, the mining industry is bound to the nation, which now is the sole owner of mineral wealth, to preserve the results achieved by mining activity for the scientific use of future generations in the form of valuable, genuine and accurate records.

ING. LADISLAV MACEK.

*The shearing machine in use in a brown coal mine.*





*Chain and buckets excavator removing the overburden in open-cast brown coal mine.*

## **Mechanization in Czechoslovak Mining.**

**10.**

In the time of the First Republic, before the last war, the Czechoslovak ore, bituminous- and brown-coal, and lignite mines presented a high grade of mechanization. The occupants looked with amazement at the machines and equipment installed in the mines, and their experts, sent to us under the pretext of instructing our miners, found with astonishment that many problems had been better solved here than in Germany, though the machinery and equipments in our mines were largely of German origin.

What were the characterizations of our mines? In bituminous coal mining the problems of working thin seams and ones of moderate thickness, had been answered successfully by means of the large, moveable coalcutters and by the concentration of operations by forming efficient working units with daily output of 1.200 tons, as well as in the field of underground conveyance and haulage, where, as the first country after England, we had introduced the face

belt conveyors of bottom carrying type. We also solved the problems of hydraulic, pneumatic, and mechanical stowing, adapting them to our conditions. The method and equipment of hydraulic filling at the Sophia Pit at Ostrava-Karvinná coal district, where the filling material is transported along an inclined drift at a gradient of 24 degrees from the surface into the mine, became a matter of interest of mining experts, who came from all parts of the world to see it. We proved the economic possibility of working the thin seams (30 to 40 cm), and under the most difficult conditions we achieved in those seams the advanced rate of 18 metres in 24 hours in driving the crosscuts; a grade of efficiency which appears to be an unusual one even in the highly mechanized anthracite mines in U.S.A. For a long time we faced very difficult problems in the brown coal mines, where the underground mining was in proportion to open cast-mining as 70 to 30. The low selling prices of

brown coal made it impossible to invest large sums in machinery equipment for underground mining. The obsolete working method hardly allowed for a coal extraction of 40 per cent and thus the economic losses were very high. Therefore, new coal winning machines and new working methods, which would allow for greater mechanization, had to be tested in an experimental scale. Working by means of slices had been tried out and also different kinds of stowing, and large, moveable, electrically driven coalcutters had been introduced. Some coalmining companies developed working methods very thoroughly. Also for the open-cast mining a method was found which could meet the condition of overburden, and the foundations were laid for a mechanized mining, of which later the occupants could so aptly make the best use.

The mechanization of the lignite mines differed only a little from that in American mines. Here we have installed and use the large cutting and loading machines and convey the coal by means of belts to the skip-winding equipment, nearly entirely eliminating the orthodox haulage system of circulating mine cars. In spite of very unfavourable physical conditions our mining achieved here very good results in this branch.

Our ore mines, which are very old and which contain only ores of poorer quality, necessitated particular attention and skill in order to be able to work them at all. It was therefore necessary to find and choose the proper types of machinery equipment. Conveyors, pneumatic drills and picks, agglomeration equipment and modern roasting ovens were installed and set in use shortly after they were invented. Our home industry which manufactures mining machinery tried in vain to overtake that of German industry. German machines were introduced into our country more and more, as the Germans had for the export all necessary favourable conditions. Their export policy was supported by German industrial circles, and when the tendency to raise the prices of raw-material threatened their export, Germany supported its export by export-premiums, by which it made it impossible for American and British manufacturers to compete with it.

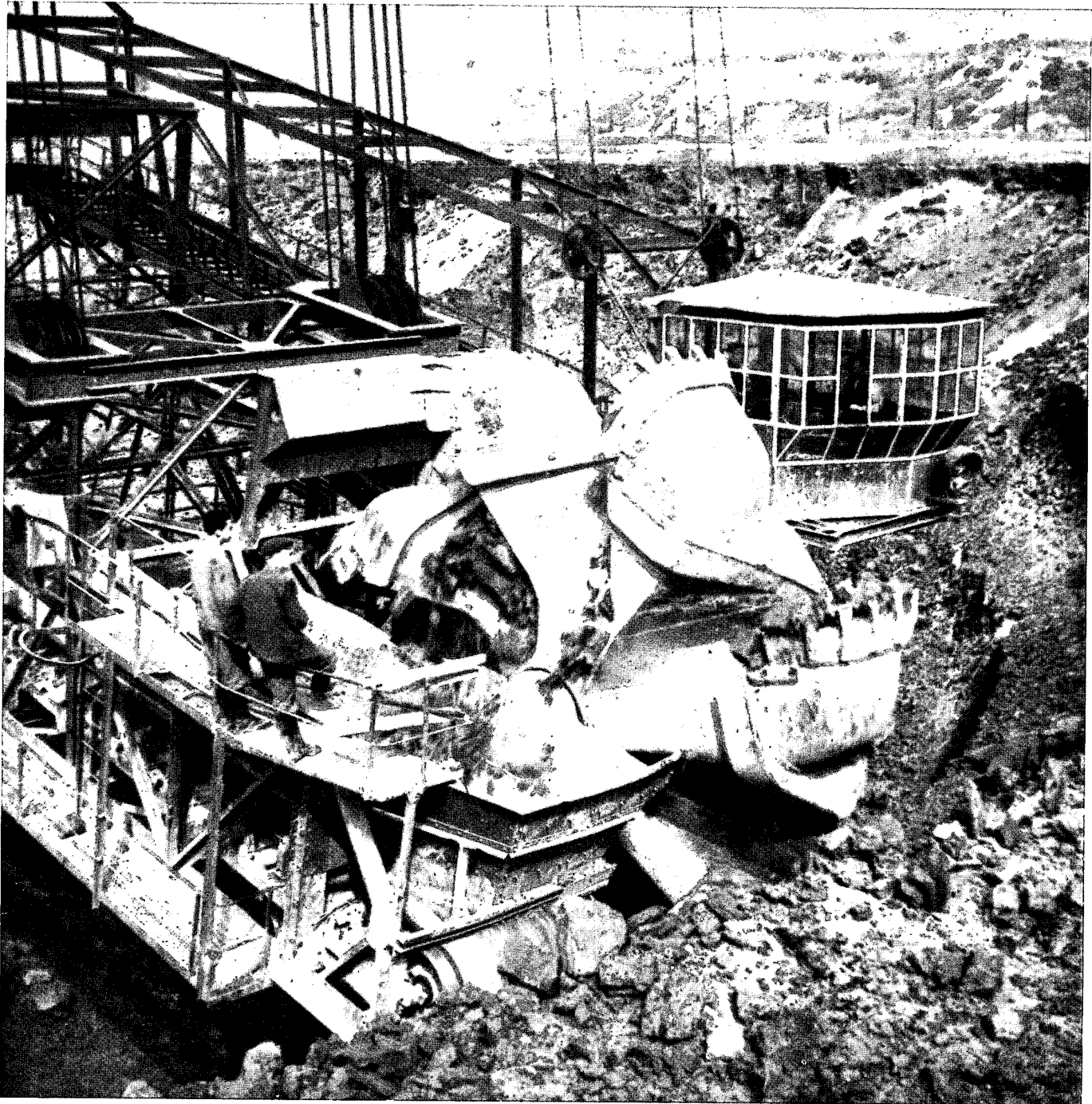
Then came the occupation of our country and the Second World War. Our mines, equipped and run very well, became the immediate object of the plundering efforts of the occupants. They tried to win from our mines as much as possible and to invest as little as possible in mining equipment. The result of this was that the machinery wore out at an increasing rate, because of insufficient maintenance, and lubrication, and the substitute materials for spare parts could not keep the machines in a proper condition. The wear in the material rapidly began to show and the machines gradually failed. Up to the end of the war even the most needful repairs were not allowed to be carried out, the only aim was to keep the output as high as possible. In their own mines, the Germans tested many new machines for hewing and loading coal, but on principle they did not send such new equipment to be tested in our mines. Therefore, after the war only a few mining machines of the newest types were left in our mines. But we are to-day well aware of the fact, that the war enabled the Germans to test many new machines and equipment, which in some cases were of revolutionary character and of great importance for mechanization in mining. And so for the Germans the way for future development is clear. Their experts have known up to now how to conceal some

of their inventions and experiences and the Allies did not entirely succeed in obtaining from them all the information which they had gained from investigations which had been tested during the war.

What tasks have we to face? The chief factor in the struggle for a better future for our miners, in these days of our new democratic Republic, is the mechanization of working, loading and hauling the coal. The arduous work of the miner can only be eased by the aid of machinery, which will increase the output and so lower the production costs. Only by perfect mechanization we can cut the working hours and raise the miner's standard of living. The management of nationalized Czechoslovak mines is aware of this fact and looks clearly into the future. The Central Board of Czechoslovak Mines sends its mining experts abroad to acquaint them with condition of mining throughout the world. It was not only the better quality of the Allies' weapons that could defeat the Germans. First of all it was sufficient quantity of coal and ores which the Allies had during the whole war, it was the high output, the high production capacity, conditioned only by the perfect mechanization in all branches of the mining industry. Therefore it is very interesting to compare the methods of mining in allied countries with those ones at present known to us. The fundamental condition of mechanizing the working of the coal is the introduction of large, moveable coalcutters. By means of these machines it is possible to break the coal from compact seams by cuts or kerfs and then by blasting to prepare the coal in such a manner, that it only needs to be loaded, thereby dispensing with all pickwork. All these operations are performed by machines. It will be our aim to introduce these methods in our country.

What assumptions have we to be able to achieve our aims? Our engineering industry suffers lack of experienced and skilled designers in the mining machinery branch and will not be able to manufacture highly efficient machines so rapidly as we would wish. Also the development of many such machines costs enormous sums. It is not easy to design and construct machines, which, for instance, load 5 to 10 tons of coal in one minute, or the large, automotive coalcutters, with revolving jib, which are able to make a cut or kerf to the depth of 2.5 meters in a minimum time. We are still not perfectly acquainted with the construction details of the huge excavators, which have the bucket or shovel cubature up to 40 cubic metres and which enable an economic stripping operation up to the seam overburden - ratio of 1/20, or even more. Therefore it will be necessary to purchase abroad at least the minimum number of these technical innovations and to search for the most efficient way of using them in our mining. We shall have to adopt a special training of those miners who will be in charge of controlling and maintaining these modern equipment. For this purpose it will be necessary to organise working teams of a relatively small number of well trained miners, which could achieve great output with this equipment. To fulfil the Two-Years-Economic Plan we shall have to face many difficult tasks. We shall have to exchange our existing equipment, which is mostly no longer up to date. This exchange is to be enabled by our engineering industry. Then we shall have to test imported machines and to adopt our working methods. The mechanization, which in this way we shall carry out as perfectly as possible, will be beneficial not only to our miners, but to all the people of our country.

ING. JOSEF HLISNIKOVSKÝ.



*The bucket-wheel of a giant excavator.*



*The Kladno miners.*







*Miners attending a T. U. meeting at which they volunteered to work overtime in order to exceed the coal output target.*

## **The Social Problems of Czechoslovak Mines.**

**11.**

The social position of the miner is dependent upon two things. On one hand it is the reputation held by the public of the miner and on the other hand the economical aspect, i. e. what his income is, whether provision is made for his dwelling, what security he has whilst working.

The success of the efforts of the Czechoslovak Mines' Management, in securing permanent labour, will depend upon the solutions to the above questions.

Even before the war the miners in Czechoslovakia had all civic rights like every other citizen; but in fact, there was not only between him and the mine-owner, but also between him and a mine-official, such a deep social distinction, that it made it quite impossible for them to be in social contact together. Indeed, the miners had the right to join Unions and to have their own work-councils, but this right was never strong enough to raise the miner to a socially high position, which would correspond to his arduous, and for

the country so important work. On the contrary, he had to fight for each of his single claims. These struggles generally culminated in numerous strikes, the results of which were always heavy economical losses.

As regards a living wage, the miners were very behindhand; their wages averaged from 32.— to 47.50 Kč per day. It must also be added that owing to the general economic depression, lasting nearly until 1938, there used to be only 3 or 4 working days weekly. So, the miner's weekly wage was only three or four times the wage per shift. For this wage miners had to give such a high output, that this was usually the limit of their physical ability.

In all coal-mining districts there was a practice of the average wage principle. This had to be kept, no matter how high the output had been, only in a few districts had a higher output been rewarded. This reward, however, was so small as to be almost negligible, and it has already been

included in the figures of average wages above mentioned and explains the higher figure of 47.50 Kč.

It can easily be understood, that under such conditions the miners' social position was low, his food insufficient, and the possibility of education and culture almost non-existent.

As regards accommodation, the conditions were not satisfactory. The miner's house could hardly be called a "house". A small, dark room without any sanitation, probably damp and very often standing on undermined ground. That was – and, unfortunately, still is – the usual type of miner's house.

As for social welfare, there was already before the war a well organized service of Health Insurance carried out by the District Miners' Funds, but Pensions and Accident Insurances were still insufficient. On the one hand they were low, absolutely according to the law-text, on the other hand because they were allotted according to the earnings, which themselves were very low. Miners' old-age pensions were called "provisions" and retired miners were known as "provisionists". Such a provision amounted to 300–400 Kč monthly, which represented one third of the sum which a miner needed for his existence, or one half if he reduced the necessities of life to a minimum. Anything beyond this low standard had to be provided by means of his childrens' support or by public charity.

The German occupation made conditions still worse and so the new democratic Czechoslovak Republic has taken over, after the war, a very sad heritage. But by a radical social policy several important and successful results have been achieved in a short time and these results discriminate accurately the position of miners now from the pre-war conditions. The heritage, which the new democratic Czechoslovak Republic took over in May 1945, was briefly told – like this:

"During the first postwar month the miners – in the true sense of the word – starved. The wages were very low, and in spite of general rapid increase of prices, they received only 150 per cent of pre-war wages. During the whole war, miners' families were not able to buy clothes, shoes or furnitures; on the contrary, owing to the general misery

and insufficient rations, they had to barter their scanty possessions, for food."

For that reason the Czechoslovak Government introduced without delay, in the months of May, June and July 1945, an extensive provision action for miners. There were, and still are, distributed in preferential order for miners special, emergency rations of basic food like meat, fats, flour, sugar, milk and vegetables and preferential rations of footwear and clothes. So the most critical situation was rapidly overcome, and now, our miners have the most important necessities of life in at least sufficient quantity. Not later than June 1945 the wages were raised, and, at the same time, began the principle, that for an increase in output, achieved in piece-work, the miner would receive a higher wage raised against the basic wage by a proportionally increasing amount, without any limitation in upward direction. In consequence of this, the average earnings of miners increased to 135–186 Kčs per shift, which represents, calculated according to the general currency ratio 1 to 3, an increase of wages by 30 per cent. And because there is now exclusively six-days working week, the miners' incomes are relatively nearly three times as high as they were before the war, when the working time used to be restricted.

In addition, there is paid leave for miners up to five weeks per year, which before the war was twelve days at the most. Also 5% of the deserving men from each mine are sent, at public expense to a winter or summer resort. This welfare arrangement did not exist before the war at all. The quantity of miners' coal allowance has at last been increased. So the miner's average standard of life has been raised at least threefold.

As for the question of insurance, already an act had been issued, under which each employee of the mining industry, whether official or workman, would have the benefit of a uniform pension, which solves in a very favourable way the question of old age and invalidity.

The amounts from the former insurance are being valued, so that higher benefits will be paid to insurance cases which came into existence after 1st January 1947, the effective date of the law.



Some of the informative publications issued by the Central Board of Czechoslovak Mines.

The basic benefit brings 14,000.— Kčs yearly.

In the case of an accident to a man working underground there is no waiting period. In general, the benefits for employees, who have worked underground, are considerably higher. The pensions may reach 90% of the average salary or wage. Besides the old-age and invalid insurance the Law provides also pensions for widows (with a minimum benefit of 6000.— Kčs yearly) and for orphans. The orphans' pensions relate also to step-children and foster-children and, under some conditions, also to illegitimate children, to grand-children becoming orphans, and eventually to other dependants (aged parents, brothers and sisters).

The following examples of calculated benefits and the comparison with the figures of 1st January 1937 will make the matter clear.

Under the Miners' Insurance Act the old-age pension will be a certain percentage of the average yearly income. The percentage will be according to the number of years employed, i. e. the pension of an underground worker with an average yearly income of 48,000.— Kčs and of a surface worker with an average yearly income of 32,000.— Kčs respectively will amount to:

	for underground worker per cent of income	for surface worker per cent of income
after 10 years of employment	53	47
" 15 " " "	63	54
" 20 " " "	73	61
" 25 " " "	83	68
" 30 " " "	90	75
" 35 " " "	90	82
" 40 " " "	90	89

The following table shows the comparison of provisions under the Law No. 200/1936 with the present miners' pensions.

#### Invalid (old age) pensions:

Insurance fees paid for years	Provisions paid to the 1st January 1937	Pensions under the new Act						Maximum pensions when the income was 6,000.— Kčs monthly
		Paid to the 1st January, 1947		Newly employed insuree				
		surface monthly income 3,200.— Kčs	under- ground monthly income 4,000.— Kčs	surface monthly income 3,200.— Kčs	under- ground monthly income 4,000.— Kčs	surface	under- ground	
10	1 650	14 938	20 880	16 752	25 200	26 160	34 800	
20	2 490	18 298	25 680	22 128	34 800	36 240	49 200	
30	3 300	21 658	30 480	27 504	43 200	46 320	63 600	
35	3 750	23 338	32 880	30 192	43 200	51 360	64 800	

#### Widows' pensions:

10	825	10 469	13 440	11 376	15 600	16 080	20 400
20	1 245	12 149	15 840	14 064	20 400	21 120	27 600
30	1 665	13 829	18 240	16 752	24 600	26 160	34 800
35	1 875	14 669	19 440	18 096	24 600	28 680	35 400

#### Pensions for fatherless child:

10	330	5 235	6 720	5 688	7 800	8 040	10 200
20	498	6 075	7 920	7 032	10 200	10 560	13 800
30	666	6 915	9 120	8 376	12 300	13 080	17 400
35	750	7 335	9 720	9 048	12 300	14 340	17 700

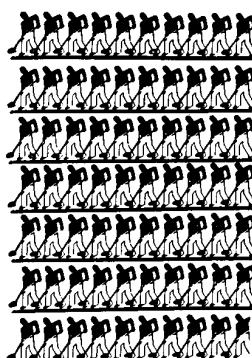
#### Pensions for orphans:

10	660	10 469	13 440	11 376	15 600	16 080	20 400
20	996	12 149	15 840	14 064	20 400	21 120	27 600
30	1 332	13 829	18 240	16 752	24 600	26 160	34 800
35	1 500	14 669	19 440	18 096	24 600	28 680	35 400

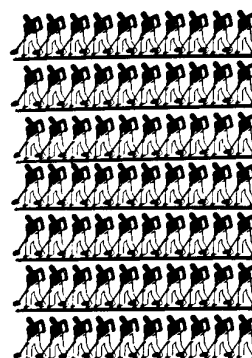
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1946

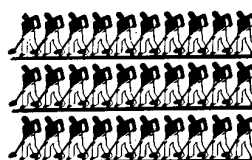
DECEMBER



Bohemians 69.961



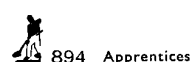
73.894 Bohemians



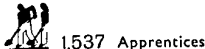
30.485 Germans



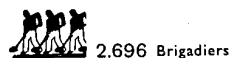
15.643 Germans



894 Apprentices



1.537 Apprentices



2.696 Brigadiers



11.322 Brigadiers

#### Movement of manpower in Czechoslovak mines in 1946.

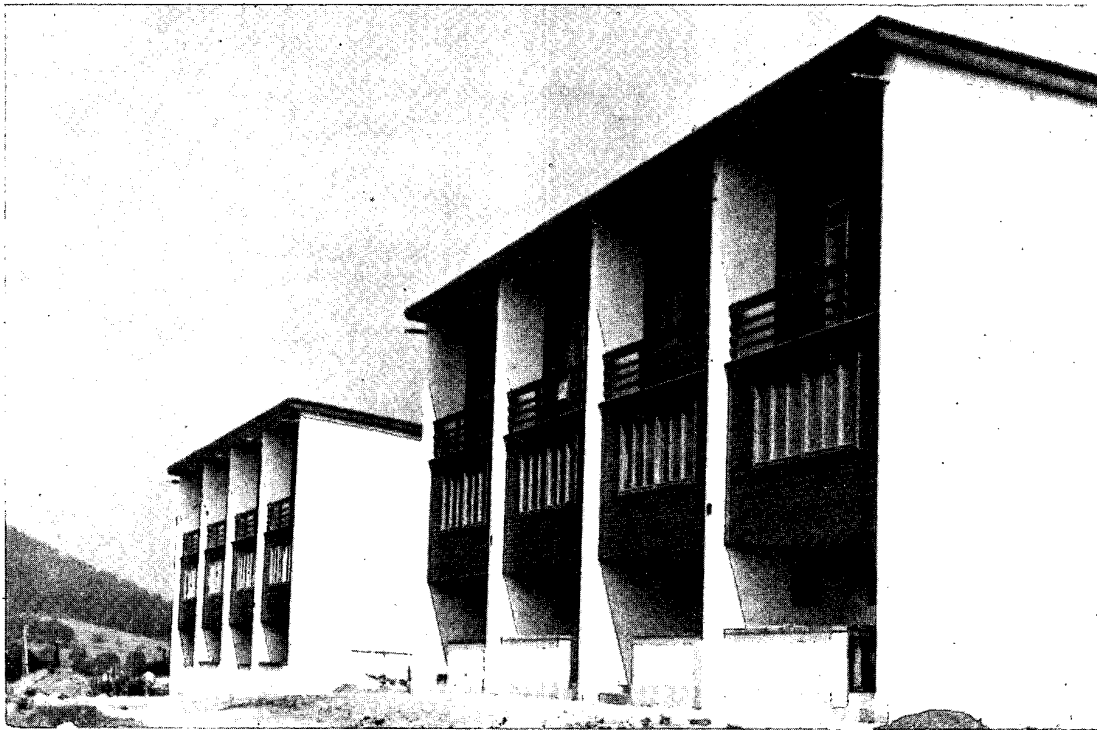
From the social standpoint the miner has to-day equal rights of citizenship. Under the influence of a single Trade Union Organisation, in which all miners, from the General Manager to the youngest apprentice are united, a social, mutual approach, which brings them together, has come about. The raising of the social position of miners gained moral support by such circumstances, as the President of the Republic on several occasions receiving miners' delegates and by high state office holders customarily paying visits to miners directly in pits, in their own working surroundings.

The bad housing situation could not yet be improved. The Two-Year Reconstruction Plan assumes the building of 3239 new and the restoration of 1430 dwelling units for miners. Each dwelling unit will consist of kitchen, two rooms, bathroom and conveniences and will have an adequate garden. Every dwelling must be equipped with running water and electric light. In the most important coal-districts the building of miners' houses has just started. So in this way the Management of Czechoslovak Mines helps also the successful recruitment of new labour for the mining industry.

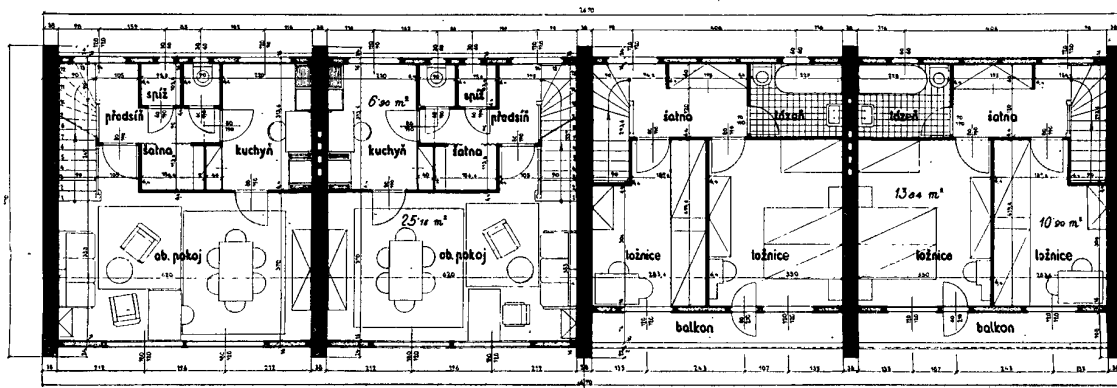
In May 1945, after the conclusion of the second World War, when Czech miners returned to the border coal-mining districts, they found the mines plundered and neglected. The mining machinery and equipment was damaged



*Miners' dwellings of olden days; still to be seen at some places.*



*Miners' houses now being built. View and ground-plan.*



or worn out to such an extent that it was no longer safe. First of all it was necessary to bring everything as quickly as possible to a state which would enable the mines to start operating and to give as much coal as it was necessary for the economical revival of our liberated country.

For that purpose skilled mineworkers and craftsmen were needed. Of course, only Czech workers were wanted for, even though some German labour was employed, all confidence in their work had gone and could not be regained. The miners asked the employees of inland industrial plants to help them. The Trade Union organisation of these works understood the importance of the situation and arranged working groups, largely at the direct suggestion of enthusiastic workers. These were the first voluntary working brigades, which readily went to lend a helping hand to miners for either a short or a long time.

Successively, other men, nonexperts in technical works, presented themselves to work in collieries and made themselves very useful at auxiliary work. They also made it possible for the undesirable Germans still working in our mines to be replaced gradually by Czech workers.

The solidarity of workers assured the operation of most collieries in the frontier districts during 1945. About 5% of the brigade-men even decided to remain as permanent employees.

In 1946 the need for coal for developing industry rapidly increased. At the same time the nation unanimously decided to get rid of, as soon as possible and for ever, the rest of German labour in our country. The arrangement of voluntary coalmining brigades therefore became temporarily an inevitable measure for securing the operation of mines. In June 1946 the Government charged the Ministry of Industry with recruitment of coalmining brigades. The Ministry of Industry in co-operation with the Ministry of Social Welfare, the Central Council of Trade Unions and with the General Management of Czechoslovak Mines, gave a well organized setting to this action.

An obligatory period of 4 months was fixed for brigade work. For these brigades-men the same supplying advantages were secured as for the miners. Their wages were settled at the level reached in their original employment, and separation allowances were obtained for their families. The carrying out of recruitment of brigades was left to the Trade Unions, the direction of brigades for work in individual mines assigned to the General Management of Czechoslovak Mines. During the second half of 1946 about 27,040 temporary workers from industry, public and civil-service employees and also University students assisted in coal mines in Bohemia and Moravia. The Czechoslovak Army sent 1,913 men belonging to combined military units to help out in coal mines. Slovakia sent 5,000 men.

The action of voluntary coalmining brigades was an absolute success. By the second half of 1946 it was possible to remove 14,842 German workers from our mines. The percentage of brigades-men who decided to remain in mines permanently, also increased.

In fact, the brigades deserve to be met with full approval. First of all, they give the mines managements the time necessary for building the houses for permanent workers and they will be an important help in coal mines until these are mechanized and their workings rationalized. Apart from this they propagate, in all classes of the nation, the importance of the miners' work and remove the barriers of lack of interest in mining, barriers once intentionally built around mining. There is no doubt that, as soon as the Two-Years Plan can solve the housing problem, the coalmining industry will gain the best permanent workers from the file of voluntary brigade-men.

In spite of all their success the volunteer brigades can not be a permanent solution to the lack of manpower in coal mines. In a relatively short time the brigade-man cannot acquire the knowledge and experience of the skilled miner. The efficiency of a brigade-man working underground



Poster reminding the miners of their promise given to the Government and Republic to increase the coal output.

reaches, at the most, 75% of the permanent miners' efficiency.

Only in obtaining a sufficient number of permanent workers a definite help can be given to coal mines. But this immediately bears upon the solving of the housing problem. Men apply for permanent work in coal mines, on condition that a suitable house or flat will be allocated to them. But there is a great lack of houses and flats in coalmining districts. Where conditions were more favourable and it was possible to accommodate workers, permanent manpower was gained chiefly from re-emigrants returning from Hungary, Yugoslavia and Westphalia, and also from men returning to mining after having left the industry for other occupations immediately after the war.

However, all this is only a partial solution and the problem becomes a national one. The final solution can not be achieved until the houses, as laid down by the Two-Years Plan, are built. Until these are complete a regular flow of permanent manpower, resulting from recruitment and transference of surplus employees from other branches of industry, cannot be expected.

Meanwhile the Propagation Department of the General Management of the Czechoslovak Mines is doing everything in its power to boost mining as a career. By means of the wireless, films and publications this propagation is mainly directed to young men and to boys just leaving school, as the most important problem to be solved by the



*About 40% of mining apprentices were recruited in 1946 by the help of this poster, published by the Czechoslovak Mines.*

recruitment campaign is that of the new generation of future miners.

After the Second World War mining became in most countries a branch of industry with men past middle age. So in Czechoslovakia the average age of miners is about 40 years.

With Czechoslovak mines it is not only the question of increasing the number, but also the question of increasing this number by young men. It is an old experience, that the best miner is he who has worked in mines from his youth.

Therefore, the main effort of manpower recruitment for mining apprentices must be concentrated amongst the young generation. To this purpose a propagation of coal mining serves. It at first tries to root out the prejudice, which still remains, from early days, amongst parents against their sons' work in mines. To-day, mining has become a recognized and well paid trade and the time of apprenticeship is no longer a time of torture. Now, the young apprentices are provided for very well. The boys live together in the modern equipped "Apprentices' Homes", and a higher standard of living is reached than in most of their own homes. The boys have their own libraries, readingrooms, clubrooms, baths, playgrounds. For managing their affairs they have a system of self government. The boys are under permanent pedagogic guidance and medical control.

In the training school, which lasts for three years, the

boys acquire not only the theoretical elements of mining but are also practically trained as they successively pass from school education to work at the surface and finally underground. They are trained by skilled miner-instructors and engineers.

The apprentices' daily work equals an 8-hour shift, ending at 2 p. m. Then the boys have their own free time, which they spend in reading, sports and entertainment. For a long holiday they are sent to the sea or into the mountains. If a boy shows distinguished ability in school, he may continue in his professional training in higher courses or school, reaching eventually the possibility of studying at the University Mining School.

The boys are well provided for financially. They get a monthly allowance, the amount of which varies according to different districts and to the age of the boy when he enters the training-school. The lowest amount in the 1st year of school is 1.080.— Kcs monthly, the highest, in the 3rd year reaches 1.570.— Kcs with an extra of 25%. This allowance is sufficient to pay for his food, clothing and other necessities and there still remains enough money for saving. The boys wear the same traditional costume worn by miners as well as by mining engineers thus emphasise the unity of the mining profession.

The propagation of mining as an occupation, its very favourable economic and social conditions, regulated by new laws, excellent conditions for apprentices, is all having such an effect, that more and more boys are choosing mining for their careers. The capital invested in the training of boys is, in fact, a very profitable investment and gives hope that our new generation of miners will secure the future of Czechoslovak mining and will be its pride.

JUDr. VÁCLAV VLK.

*Below: A mining apprentice.*





*A town in a coal-mining district.*

## **The Foreign Trade and Marketing Possibilities. 12.**

Before the war the Czechoslovak Republic carried on a brisk reciprocal foreign trade in the most important branch of its mineral production; Czechoslovakia was selling as well as purchasing coal. As the most important Czechoslovak coal mining districts are situated near the frontier, their location is very advantageous for supplying some consumers abroad. On the contrary, foreign coal was preferable to our own coal for some purposes.

So, for instance, we exported in the year 1937 to Germany 1,799,000 tons of brown coal to the value of about 171,000,000 Kč and imported from Germany 1,108,000 tons of bituminous coal worth about 159,000,000 Kč. Export of our bituminous coal was chiefly to Austria (1,279,000 tons worth about 160,000,000 Kč), but also to Hungary, Germany and Italy. On the whole the export balance was an active one. We exported coal to the value of about 439 million Kč, while the coal import amounted to about

177 million Kč. This favourable balance was still improved by the coke export. For the same reason as with coal we also imported coke from Germany, about 164,000 tons in the year 1937. Nevertheless, our export of coke exceeded the import by as much as 943,000 tons. It was sent not only to the neighbour states, such as Austria and Hungary, but also to countries further away, such as Sweden, France, Yugoslavia, Italy, Switzerland, Finland, Rumania, etc.

On the whole, the balance of Czechoslovak foreign trade of mineral fuels was active. Against the import to the value of about 211 million Kč there was an export worth 593 million Kč. As to the quantity of exported coal and coke, our brown coal export represented more than 10 per cent of the total output, that of bituminous coal over 13 per cent, and coke nearly 20 per cent of production. As found to be in the year 1946, the development after the war was in our country in accordance with the development



in other coal producing European countries. Like them, we were also compelled to reduce our export very considerably. In the year 1946 we exported

brown coal - - - - -	300.925 tons
bituminous coal - - - - -	30.659 „
bituminous coal coke - - - - -	246.703 „
brown coal coke - - - - -	30.852 „

Unfortunately, the supply did not meet the demand, but if all goes according to plan, our export in 1947 will be substantially increased in comparison with that of 1946, though it will not come up to that of pre-war years. We hope to export about 700 to 800 thousand tons of brown coal, which would be nearly as much as 40 per cent of the pre-war export. In bituminous coal our exporting possibilities are much more modest and will probably reach only 10 per cent of pre-war export. The situation of the coke trade is relatively best. The assumed coke export will be about 50 per cent of that achieved in the last pre-war year. Czechoslovakia decided upon these export quotas in spite of the great lack of fuel for her own need, realizing her duty to aid to the best of her ability her former customers abroad.

On the other hand we also intend to import coal, chiefly from Poland and a smaller quantity from Hungary. As during previous years, so now export will, however, greatly surpass import. From this can be seen our efforts to regain our pre-war foreign markets and to place ourselves again in the position to which we are predestined by the geographical location of our coal mining districts.

It is, of course, not to be expected, that progress from present conditions will follow the track of previous years; on the contrary, considerable changes must be taken into account, arising from two circumstances, viz.:

1. The structural changes, which have taken place in our coal production as well as in that of other countries.
2. The changes which have come about in the power economy of our neighbours as well as of more distant customers.

In the first case it will be not without affect, that our coke plant were considerably enlarged during the last war, so that the present production capacity of our coke industry is much higher than it used to be, and that, we also produce the brown coal coke. Unfortunately, the output of cokeable bituminous coal is not yet in line with the coke plant capacity, being still below the brown coal output, which has already reached the pre-war level.

It is difficult to foretell the development of foreign trade in future years; when the present coal shortage is overcome. In adapting themselves to the present conditions of depression countries utilize all practical measures to restrict the consumption of coal and try to replace it by other sources of power. There is no doubt that these efforts will be, at last, successful, and that this will have immediate influence on the foreign fuel trade. For instance, in Austria and Hungary there have been raised relatively big petro-

leum industries which produce much more than the domestic consumption demands. Both these countries will therefore undoubtedly replace a part of their former coal demand by petroleum and in addition they will have petroleum and its products at their disposal for export. So it is possible, that in the relations between these countries and Czechoslovakia a leveling of the balance of power-resources will take place. We shall import oil and oil products from these countries and export coal and coke to them.

As far as other useful minerals are concerned the situation is different. Following table illustrates the variety of export and import of several mining products in the year 1937 and 1946.

	1937		1946	
	Import	Export	Import	Export
	in metric tons			
<i>Iron ore, total:</i>	14 995 000	1 816 000	12 973 650	490 250
of this:				
Sweden	8 486 700		4 913 780	
U.S.S.R.	1 874 000		4 183 610	
Yugoslavia	1 635 000		249 690	
Austria	1 086 000		3 166 380	
Hungary		1 806 000		490 250
<i>Antimony, total:</i>	66	11 663		7 495
<i>Fireclay, total:</i>	6 880	976 000		47 335
<i>Graphite, total:</i>	35 350	28 800	357	8 880
<i>Montan wax, total:</i>	3 774	929		10 196

As regard iron ore, the import nearly reaches pre-war level. Most iron ore is imported from Sweden with the U.S.S.R. and Austria, taking the second and third places. The import from Yugoslavia, on the contrary, is only a fraction of what it was before the war. As regards other our export products, trade has not yet been fully developed with the exception of montan wax.

Because of the great demand of goods, chiefly for fuels, the trading possibilities of our mining industry are, of course, very good; unfortunately, they are restricted by the capacity of our industry and by the obvious necessity to supply the home market first. By increasing the production, as foreseen by the Two-Years Economic Plan - and we firmly believe that the aims of the Plan will be reached -, we shall again be able to serve our foreign customers as we want to do.

CTIBOR BUBELA.